The RUBBER AGE

October, 1942

MIXED CARLOADS

Consider, if you will, the possible desirability of taking mixed carload shipments of:

P-33 *and* **THERMAX**

F. O. B. STERLINGTON, LA.

KALITE *and* **KALVAN**

F. O. B. PAINESVILLE, OHIO

CAR LOADINGS MUST BE HEAVIER

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City

Newsletter No. 10 *PUBLISHED BY RUBBER CHEMICALS DIVISION OF* DU PONT *OCT., 1942*

Acceleration of Buna S Compounds with 2-MT Improves Resilience

THE *thiazoline* accelerator, 2-MT, has been highly recommended for use in rubber goods required to withstand dynamic service. Its ability to impart to rubber vulcanizates excellent heat resistance and resilience and low hysteresis are of particular value. 2-MT is chemically 2-mercapto-thiazoline. Although it is related chemically to the thiazoles, it reacts differently from them or their modifications in Buna S compounds.

As is generally the case with other accelerators in Buna S, larger quantities of 2-MT are required than are recommended in rubber. However, 2-MT is a very active accelerator for all types of Buna S compounds, producing fast curing stocks with high moduli and tensile strengths. Despite the rapid rate of cure at normal vulcanizing temperatures of the order of 287°F., 2-MT accelerated Buna S stocks are relatively inactive at processing temperatures and show practically no indication of cure when vulcanized for 60 minutes at 227°F.

ACTIVATION OF 2-MT— In Buna S stocks, 2-MT may be effectively activated with basic accelerators such as Thionex, (tetramethyl-thiuram-monosulfide) Accelerator 808 (a butyraldehyde-aniline condensation product) or DPG (diphenylguanidine). Thionex is the strongest of these three activators, with Accelerator 808 next and DPG the weakest. All permit a reduction in total accelerator content as compared with the use of 2-MT alone.

2-MT—808 COMBINATIONS—2-MT activated with Accelerator 808 is a particularly interesting accelerator combination for Buna S. Not only is the combination more economical to use than 2-MT alone, but it produces vulcanizates having better all-round physical properties. Buna S vulcanizates accelerated with 2-MT—808 are characterized by high moduli and tensile strengths and high elongations at break. While they compare favorably in these properties with Buna S stocks accelerated with Thionex (see Newsletter No. 9, September, 1942) the rate of cure at vulcanizing temperatures is not so fast and the curing range is not as broad as with Thionex.

The most outstanding characteristics of 2-MT—808 accelerated Buna S stocks are their high resilience and low mechanical hysteresis (low heat build-up). These properties, which are of particular importance in applications involving severe dynamic service (such as pneumatic tires,) are illustrated by the data in the accompanying table.

COMPARISON WITH OTHER ACCELERATORS—2-MT—808 acceleration of Buna S has advantages over other commonly used accelerators such as straight MBT, mercaptobenzothiazole reaction products and activated MBTS. The 2-MT—Accelerator 808 combination has a faster rate of cure and produces vulcanizates having higher moduli and tensile strengths, and superior resilience. If the curing time is adjusted so that the same state of cure if obtained in all stocks, the ultimate elongations at break and tear strengths are comparable. For any given time of cure at 287°F., vulcanizates accelerated with 2-MT—808 show only very slight impairment of stress-strain relationship when the cure is extended to as long as 180 minutes.

BUNA S COMPOUNDS ACCELERATED WITH 2-MT ACTIVATED BY ACCELERATOR 808

Compound No. 1693B—	314	329
Filler	50 parts Channel Black	30 parts Soft Black
Scorch Test—Cure 60 minutes at 227°F.		
Tensile Strength p.s.i.	125	100
Elongation at Break—%	745	885
Original Physical Test Data Cure 60 minutes at 287°F.		
Stress at 300% elongation p. s. i.	1800	625
Tensile strength p. s. i.	2825	1325
Elongation at Break—%	410	460
Hardness—Shore A Durometer	68	51
Tear Strength—lbs. per inch thickness	145	60
*Permanent Set in Elongation (ASTM) %	6	4
Pellet Tests Cure 130 minutes at 287°F		
Resilience (Yerzley Oscillograph) %	58	72.7
Heat Build-up (Goodrich Flexometer in 20 min. expressed as °C.)	56	67
Aged in 100°C. Air Oven Cure 60 minutes at 287°F		
Tensile Strength p.s.i.	1925	850
Elongation at Break—%	135	230
Hardness—Shore A Durometer	79	58

*Stretch samples 200%; hold 10 minutes; release and measure after 10 minutes rest.

Through the Mill

NEOPRENE TYPE GN *is a general purpose type of neoprene, and is being produced and used in much larger quantities than E and G or the specialty types. Neoprene Type GN should be used unless extraordinary service conditions dictate the selection of a type of neoprene especially developed for some particular property. The specialty types of neoprene and purposes for which they should be used are listed:*

Type CG—Adhesive cements and special purposes where stiff, uncured stocks are desired.

Type FR—Freeze resistance, high resilience, low permanent set and low water absorption.

Type ILS—Low swell in many solvents including water.

Type KNR—Low viscosity cements, coating compositions and wherever exceedingly high dry filler content is desired.

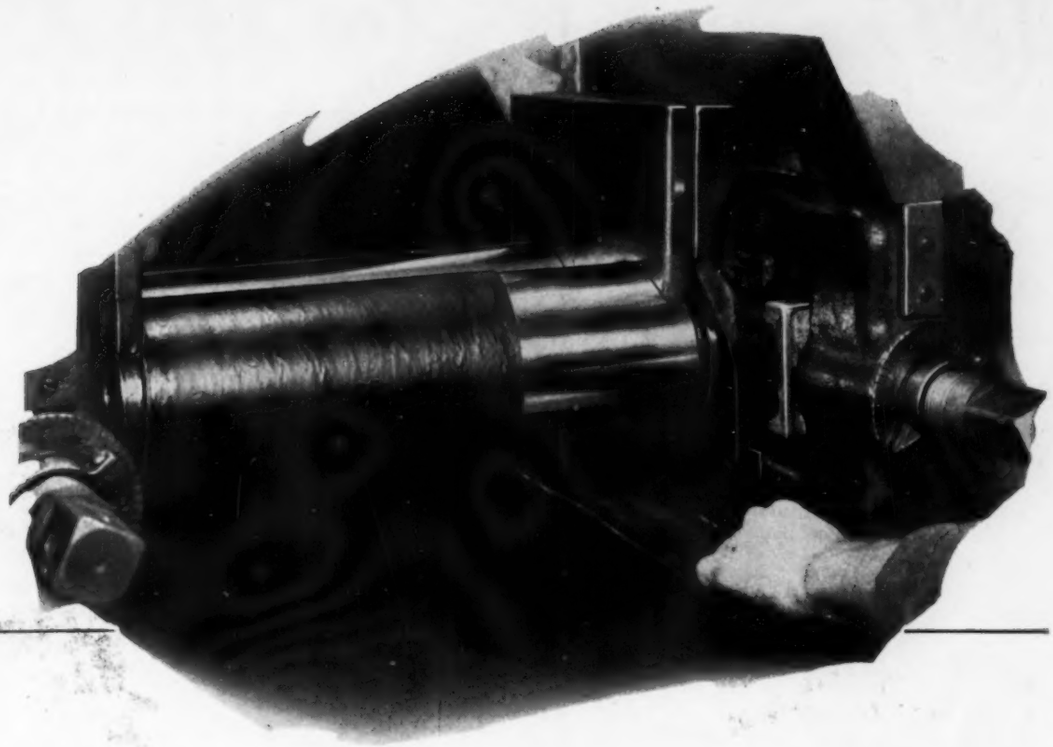
Type M—Non-discoloring type.

BUNA S *will be the major substitute for natural rubber. Make the du Pont Rubber Laboratory your headquarters for basic compounding information and suggestions to meet the requirements of specific services with Buna S compounds.*

RUBBER CHEMICALS DIVISION

Wilmington DU PONT *Delaware*

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year. Canada, $3.50; Foreign, $4.00. October, 1942. Vol. 52, No. 1.



It's Rolling Out the Wrinkles in a Problem

When a rubber fabricator comes to Hycar's Customer Service laboratory with a problem he gets no pat, textbook answer. He wants and gets facts, based upon actual physical, chemical and operating tests conducted by men who know their business and understand his problem.

That's why we regard this Customer Service laboratory of ours as *your pilot plant.* Fully staffed with men of ability, training and experience in synthetic rubber, completely equipped for thorough testing and experimental work, it is designed to iron out the wrinkles in your compounding, processing, production, or other problem in synthetic rubber fabrication.

Use this laboratory and the facilities it has for you, and get the most out of the great number of remarkable properties of Hycar Synthetic Rubbers.

HYCAR CHEMICAL COMPANY, *Akron, Ohio*

HYCAR *Synthetic* **Rubber**

LARGEST INDEPENDENT PRODUCER IN AMERICA OF BUTADIENE SYNTHETIC RUBBER

OUR ARMED FORCES ROLL ON RUBBER

CLIMCO PROCESSED LINERS

KEEP PRODUCTION ROLLING
and PREVENT WASTE OF CRUDE

Your biggest job today is to keep production moving and avoid waste. Climco Processed Liners will help you do it, in the handling and separation of uncured stocks. Climco Processing, a tough, flexible glaze that is applied to the liner, prevents stock adhesions and insures better separation. Thus it prevents: 1. Gauge distortion that leads to rejects and consequent loss of the rubber in its crude form. 2. Time out for repairs due to sticking and tearing. 3. Constant cleaning between trips to the calender. 4. Rerolling for cooling. ★ Climco has other advantages, too—it reduces labor and power costs, and greatly lengthens the life of the liners. ★ In the last 20 years more and more leading firms have *standardized* on Climco Processing.

CLIMCO

LINERETTE
INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

THE CLEVELAND LINER & MFG. CO.
CLEVELAND, OHIO

CLIMCO PROCESSED LINERS
For Faster, Better Production at Lower Cost

NAFTOLEN*

*REG. U. S. PAT. OFFICE

CRACKS THOSE RUBBER PROBLEMS

NAFTOLEN is an unsaturated and reactive hydrocarbon capable of covulcanization with natural and synthetic rubber. Because of its unique ability to react with sulphur it can be used in large proportions. Naftolen functions as an extender, a vulcanizable plasticizer, a dispersing agent, and a tackifier. Available for prompt shipment. Complete technical information on request.

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for **INSULATED WIRE**

Tensile strength

Resistance to aging

Dielectric strength

Write Our Technical Service Dept. for Details.

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COOPERATION of thousands of scrap rubber collectors, with our Company, enables us to very substantially help the Rubber Industry to meet the unprecedented reclaimed rubber requirements, brought about by the war effort.

SCRAP RUBBER FOR VICTORY

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American Process

Zinc oxide

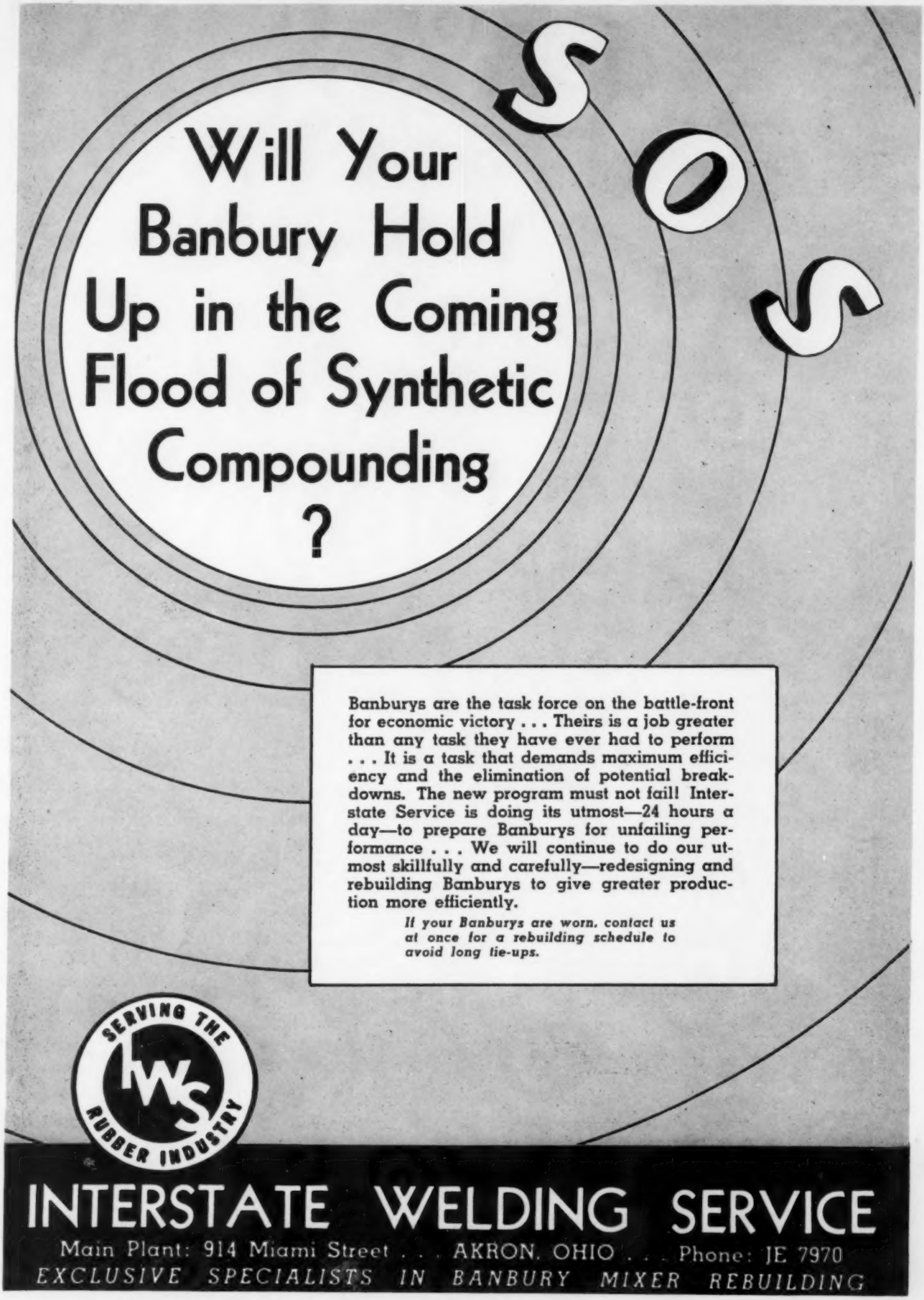
is now available for your rubber requirements

New Jersey Zinc

The New Jersey Zinc Company

160 Front Street, New York, N. Y.

Uniform Quality Zinc Oxides . . . The Horse Head Brands


SOS
Will Your Banbury Hold Up in the Coming Flood of Synthetic Compounding ?
Banburys are the task force on the battle-front for economic victory . . . Theirs is a job greater than any task they have ever had to perform . . . It is a task that demands maximum efficiency and the elimination of potential breakdowns. The new program must not fail! Interstate Service is doing its utmost—24 hours a day—to prepare Banburys for unfailing performance . . . We will continue to do our utmost skillfully and carefully—redesigning and rebuilding Banburys to give greater production more efficiently.
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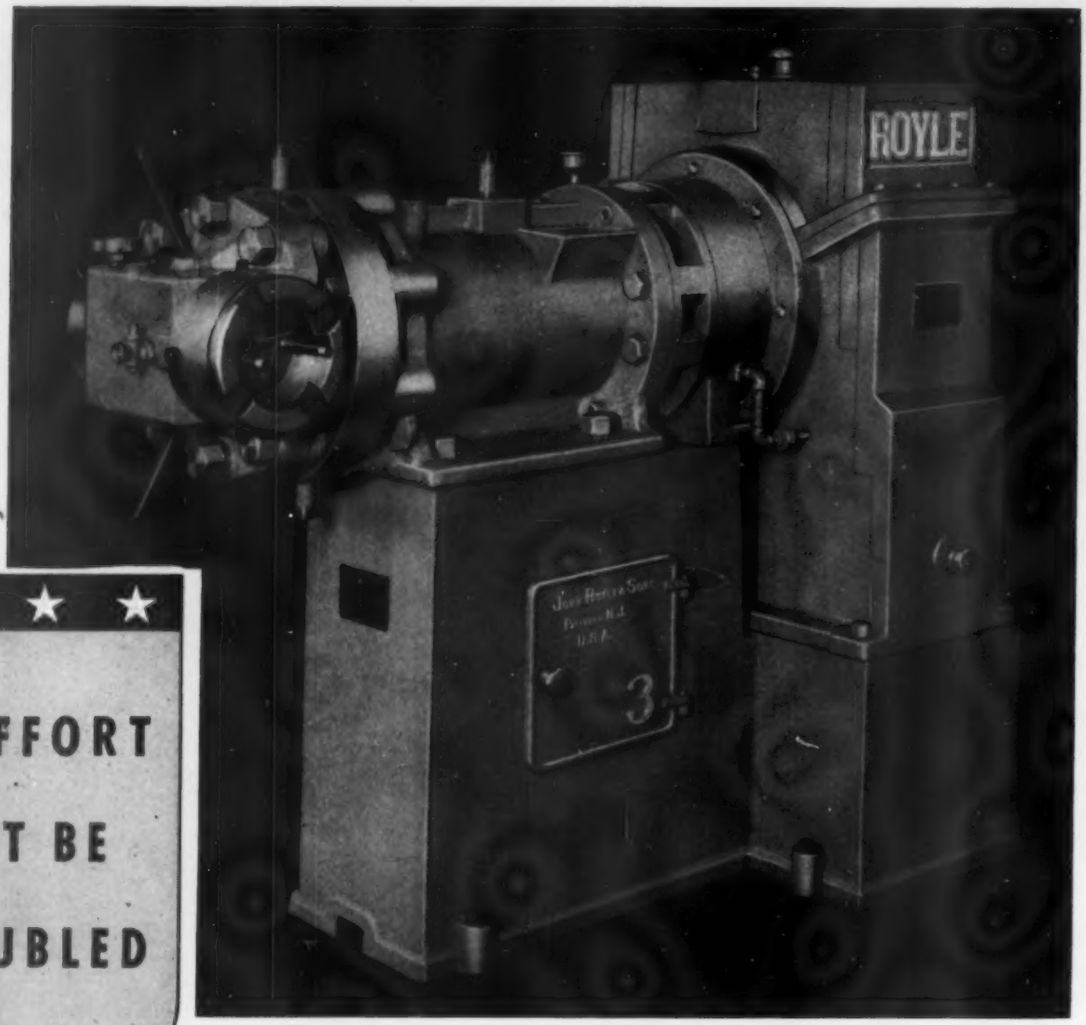

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THE EFFORT MUST BE REDOUBLED

From small and humble beginnings, America has grown. Today she is the greatest industrial nation in the world. Like the courageous pioneers who accepted every challenge with redoubled effort—we too must multiply our output.

Today, America is again pioneering. Pioneering to make herself strong. John Royle & Sons is proud to be a part of a pioneering industry that accepts the challenge of making more and better products, both for civilian and defense needs.

Advancements and improvements in production occur everyday. They will benefit you and enable us to serve you better when the emergency is over. But until that day, your patience and understanding are needed.

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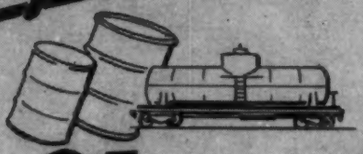

PICCO Chemicals

specially prepared for the RUBBER INDUSTRY

PICCOUMARON XX SERIES RESINS (paracoumarone-indene) for extending and compounding natural and synthetic rubber.

PICCOLYTE RESINS—similar chemical analysis (carbon-hydrogen ratio) to rubber: for extending, tackifying and cementing.

Di POLYMER OIL for plasticizing synthetic rubber of the co-polymer butadiene types.

PICCOUMARON RESINS for hardening, leatherizing or softening mechanical rubber goods.

PICCO RECLAIMING OILS (D-4, E-5, C-10) for reclaiming rubber by autoclave or pan methods.

This is *not* the time to experiment with unknown, uncertain materials! To keep production at top speed, you need pure, dependable raw materials, of the right quality for your processing.

Specify PICCO Chemicals, and be sure of the high quality and uniformity of your basic ingredients.

PENNSYLVANIA
INDUSTRIAL CHEMICAL CORPORATION
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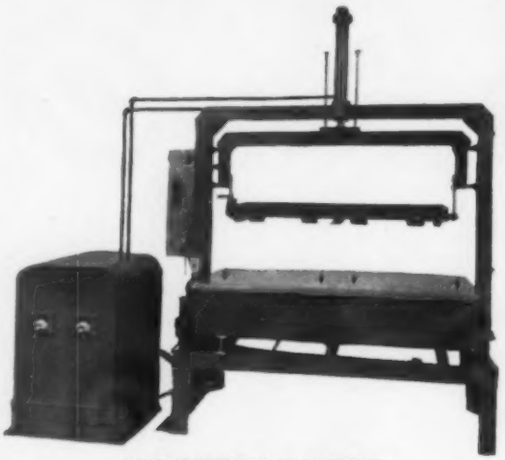
For information on all Picco Products except reclaiming materials, write Standard Chemical Company, Akron Savings and Loan Building, Akron, Ohio. Refer inquiries on the reclaiming of rubber to C. H. Campbell, 907 Crain Avenue, Kent, Ohio.

Makers of: Coumarone Resins • Coal Tar Naphthas • Rubber Plasticizers • Reclaiming Oils • Terpene Resins

The Latest Development in DIPPING MACHINES

HYDRAULICALLY OPERATED to give smooth acting variable control of the immersion and withdrawal speeds to suit article being dipped



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DIPPING CYCLE SPEED can be predetermined to meet all conditions

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REDUCE REJECTIONS . . . IMPROVE YOUR PROFITS WITH

CALCENE

Improving hot tear resistance is almost certain to cut down rejections on molded goods—and improve your profit margin.

For eight years Calcene has demonstrated its ability to improve tear resistance—even when loaded at higher levels than is possible with other standard pigments. This advantage can be important to you in the whole range from gas mask flutter valves to molded toys.

Learn at firsthand how Calcene can improve your production—and help make your rationed rubber stocks go farther in terms of finished goods.

PITTSBURGH
PLATE GLASS COMPANY
Columbia Chemical Division

Grant Building, Pittsburgh, Pa.

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New York	Cincinnati	Cleveland
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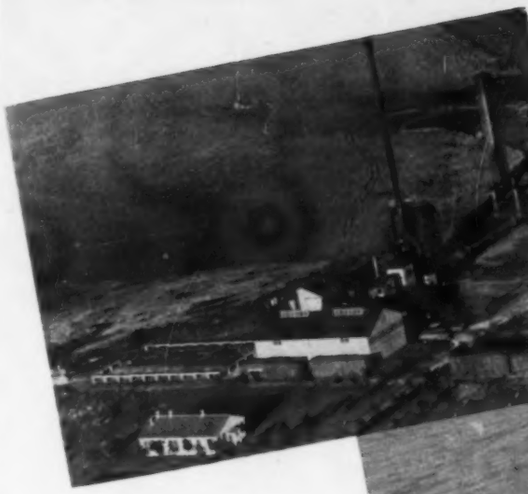

Air View,
Guymon, Okla. Plant

Air View,
Pampa, Texas, Plant.

GASTEX
TRADE MARK

PELLETEX
TRADE MARK

SYNTHETICS and SERVICE

GASTEX and PELLETEX are vital to the synthetic rubber program. General Atlas, with its two plants located in different states and gas fields, on two railroads and with two labor sources, is well equipped to do its part in providing a dependable, steady supply. Plans for again increasing the capacity are underway for 1943.

Recently, the entire management has been concentrated at the Pampa plant in order that the utmost in production efficiency, speed and delivery may be assured. Service continues to be the keynote of the producers and distributors of these very popular special process blacks.

HERRON & MEYER

OHIO BLDG., AKRON, OHIO.

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GENERAL ATLAS CARBON DIVISION

OF GENERAL PROPERTIES COMPANY, INC.

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CAPITOL LINER TREATMENT

MEANS CAPITAL RESULTS

There's no doubt about it—CAPITOL PROCESS LINER TREATMENT prevents those adhesions of compounded stock that are so wasteful of materials, time and money. The Capitol Process not only prevents adhesion and accelerates separation, but preserves the life of the cotton fabric to the extent that required purchases of piece goods are reduced materially.

This may seem a bold statement, but we'll prove it if you'll SEND US A 50- OR 100-YARD LINER AND LET US TREAT IT GRATIS—so you can test it in *your own plant*.

Here is a method that conserves rubber and cotton fabrics and saves money generally in handling compounded rubber stocks.

★

TEXTILE PROOFERS, INC.

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MIX →

WITH →

FOR →

In the cause of victory few things are more vital than conservation of the nation's dwindling rubber supplies. But fortunately there are hundreds of thousands of tons of scrap rubber available. Fortunately, too, there is no shortage of Barrett Carbonex* S.

When used in reclaim rubber stocks this improved coal-tar compounding material displays a number of significant properties.

Extender—up to 15% of the rubber hydrocarbon.

Reinforcing Softener—A highly practical control of toughness.

Rapid Extrusion—Minimizes swelling, sagging and flattening.

Improved Tear Resistance—An important factor to increase wear.

Promotes Better Processing—Calendering and extruding properties greatly improved.

Excellent Aging Qualities—A final great help in conservation.

The staff of the Barrett Research Laboratories will be glad to cooperate with you in using Carbonex S and other Barrett rubber compounding materials to meet your requirements. Wire or write today for full information.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK

Barrett

ONE OF AMERICA'S GREAT BASIC BUSINESSES

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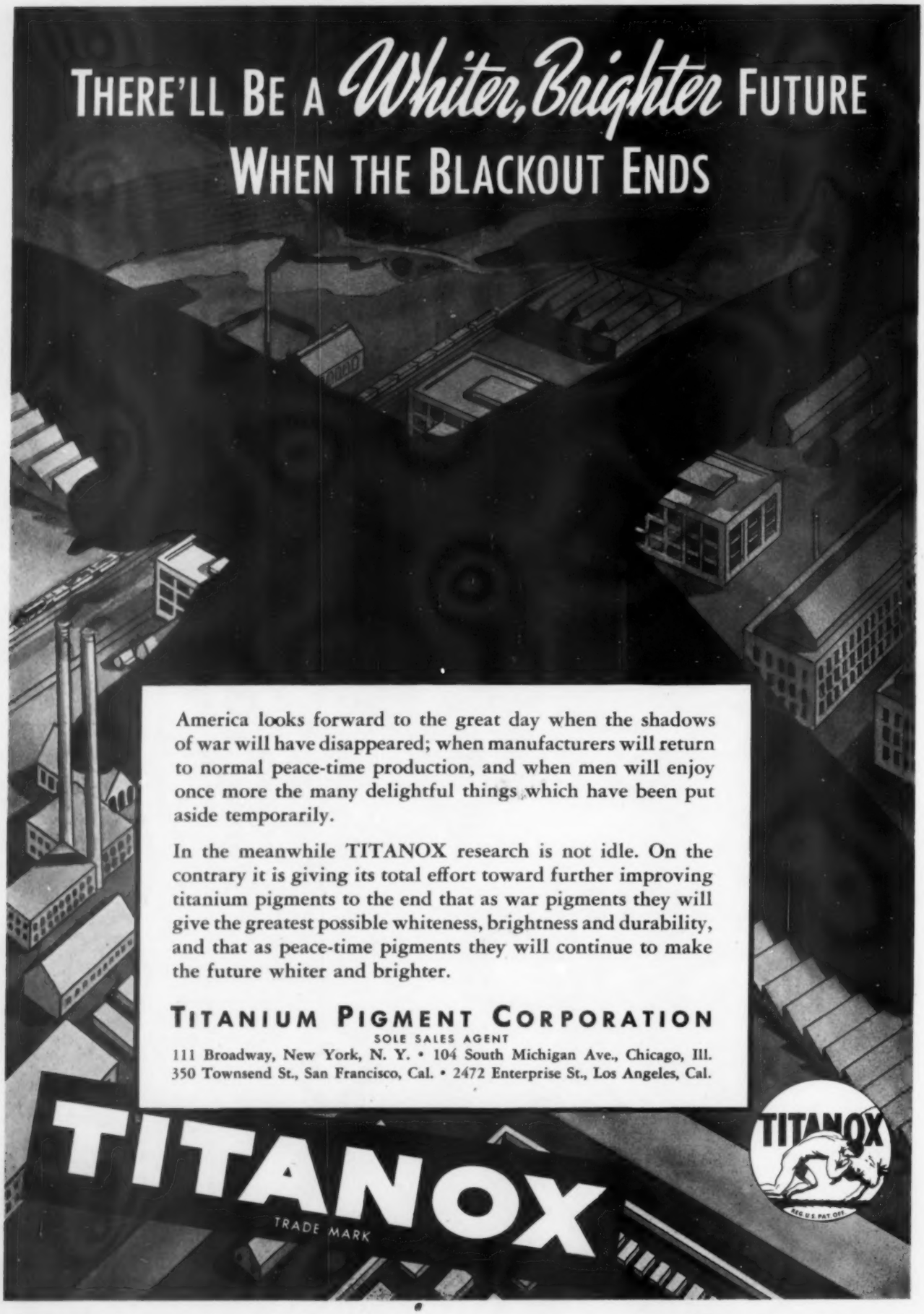
THERE'LL BE A Whiter, Brighter FUTURE
WHEN THE BLACKOUT ENDS
America looks forward to the great day when the shadows of war will have disappeared; when manufacturers will return to normal peace-time production, and when men will enjoy once more the many delightful things which have been put aside temporarily.
In the meanwhile TITANOX research is not idle. On the contrary it is giving its total effort toward further improving titanium pigments to the end that as war pigments they will give the greatest possible whiteness, brightness and durability, and that as peace-time pigments they will continue to make the future whiter and brighter.
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TITANOX
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PERBUNAN

A SYNTHETIC RUBBER OF NOTABLE LONG LIFE ESPECIALLY RESISTANT TO OIL AND TO HEAT OR COLD!

NOTICE: Although Perbunan is now allocated by the Rubber and Rubber Products Branch of the War Production Board . . . we are permitted to sell up to 200 pounds a month to customers conducting experimental work.

PERBUNAN

Write **STANCO DISTRIBUTORS, INC.** 26 BROADWAY, NEW YORK CITY
Warehouse stocks in New Jersey, Louisiana and California

BAIRD

MANUFACTURERS' CRUDE RUBBER PURCHASE PERMITS

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• Our long experience since 1903, together with our friendly relations with our old and new customers ideally equips us for the prompt, efficient and thoroughly satisfactory handling of

Manufacturers' Crude Rubber Purchase Permits

• We shall continue to appreciate and respect the business of our old friends and assure the new ones that their orders will be handled with courtesy and efficiency . . . . . .

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BAIRD RUBBER & TRADING CO., Inc.
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BArclay 7-1960

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PREVENT BIN-CURE with

CRYSTEX insoluble SULPHUR

CRYSTEX has recently demonstrated its ability to prevent bin-cure and dryness which usually occur when a reclaim compound is used.

CRYSTEX is an amorphous sulphur especially prepared to prevent bloom in uncured rubber stocks.

CRYSTEX should be used in place of rubbermakers' sulphur where repair treads or retreads are put up without a cushion. Where a cushion is put on the tread, and Holland on top of the cushion, it is only necessary to employ CRYSTEX in the cushion.

Write to our nearest office for a working sample and complete information on CRYSTEX (insoluble) Sulphur.

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Commercial Rubbermakers' Sulphur, Tire Brand, 99½% Pure—Refined Rubbermakers' Sulphur, Tube Brand, 100% Pure—Caustic Soda — Carbon Tetrachloride — Sulphur Chloride — Carbon Bisulphide

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HOW TO OFFSET EXTRA HEAT IN HEAVY-DUTY TIRES

Tests in actual formulations prove low heat generating properties of CONTINENTAL "AA" Carbon Black

Most heavy-duty tire failure is caused by the heat generated during high speed operation. Today leading tire manufacturers offset this *extra* heat with Continental "AA" — a new type black. For test after test in their own formulations has proved conclusively that Continental "AA" contributes *less* to heat generation than do standard blacks. Specially processed, Continental "AA" maintains just the right balance between wear resistance in the tread compound and heat generation in the tire itself. In today's heavy-duty tires — for truck, bus and military operation — Continental "AA" is helping to combat wear under the severe treatment and climatic extremes of wartime service.

CONTINENTAL "AA" IS EASIER PROCESSING, TOO!

In still another respect, Continental "AA" is superior to standard grades of black used in passenger car tires. It's *easier processing*. And rigid laboratory control methods insure the same high quality characteristic of all Continental Blacks, whatever the grade. Discover how completely Continental "AA" meets *your* requirements — write for samples today.

TRY CONTINENTAL "AA" IN YOUR BUNA S FORMULATIONS

If you are experimenting with this type synthetic rubber, by all means investigate the characteristics of Continental "AA." Let us send additional samples for your Buna S formulations.

Continental **CARBON COMPANY**

295 MADISON AVENUE • NEW YORK, N. Y.

Akron Sales Office: Peoples Bank Building, Akron, Ohio • SALES REPRESENTATIVES: Ernest Jacoby & Co., Boston, Mass. • Marshall Dill, Los Angeles and San Francisco, Calif.

CALCINED MAGNESIA
For Neoprene

Three types to meet all requirements of quality and cost.

- **LIGHT**—The highest type for the most exacting compounds. Fine particle size. Low moisture and carbonate content.
- **MEDIUM**—For requirements less exacting and where costs must be kept down. Fine particle size and low moisture content.
- **HEAVY**—Meets the need of lowest cost where high type compounding is not essential.

Write for samples, prices and additional information

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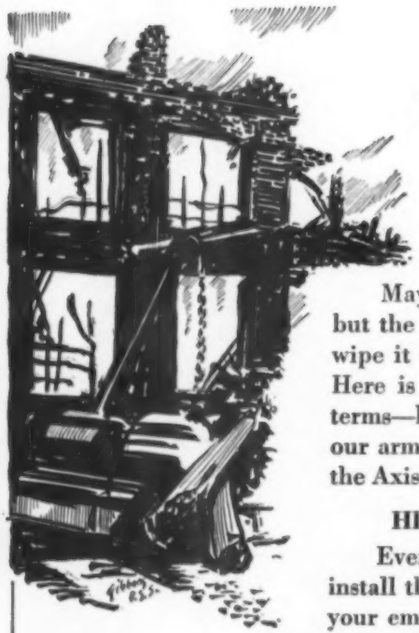
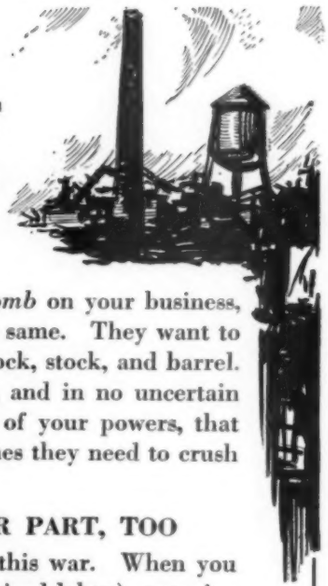


TARGET FOR TONIGHT
...*Your Business?*



Maybe they won't actually come and drop a *bomb* on your business, but the Axis war lords have their eye on it, just the same. They want to wipe it out as a competitive force—or take it over lock, stock, and barrel. Here is a threat that you can reply to *now*, today, and in no uncertain terms—by buying Defense Bonds to the very limit of your powers, that our armed forces may have the guns, tanks, and planes they need to crush the Axis *once and for all.*

HELP YOUR EMPLOYEES TO DO THEIR PART, TOO

Every American wants the chance to help win this war. When you install the Pay-Roll Savings Plan (approved by organized labor), you give your employees that chance. For details of the Plan, which provides for the systematic purchase of Defense Bonds by voluntary pay-roll allotments, write: Treasury Department, Section S, 709 12th St. NW., Washington, D. C.

***Make Every Pay Day* "BOND DAY"**

***Save with* U. S. *Defense* BONDS ★ STAMPS**

This space is a contribution to Victory by

THE RUBBER AGE

WE ARE SERVING UNCLE SAM

Operating under the direct control and supervision of the Rubber Reserve Co. — a Federal agency — in the purchase and handling of scrap rubber, we are loaning our experience and organization to the promotion of the war effort and have ceased to operate on our own account for the period of the emergency.

We are honored in having this opportunity to do our part in helping to overcome the rubber shortage.

Serving the Trade since 1868

THE LOEWENTHAL CO.

188 W. RANDOLPH ST.
CHICAGO, ILL.

159 CLEWELL ST.
AKRON, OHIO

When it's a battle against TIME—

You'll appreciate the SERVICE you get on SKELLYSOLVE!

● When you are bending every energy to meet an emergency order, one little hitch along the line can throw the whole operation out of gear.

That's why you will appreciate Skellysolve—and *Skellysolve Service. We get the goods to you when you need them*—special technical assistance, too—if you need it. Phone, write, or wire SKELLYSOLVE Division, address below.

Blitzkrieg from Below

A rock shot out of this Skelly Oil Well struck the steel crown block. The spark set off this explosion—caught by the camera before the fire reached the main column. Considered by many to be the most unusual photo of an oil well fire in existence. A split second later and the camera would have been too late.

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SKELLYSOLVE *in the* RUBBER INDUSTRY

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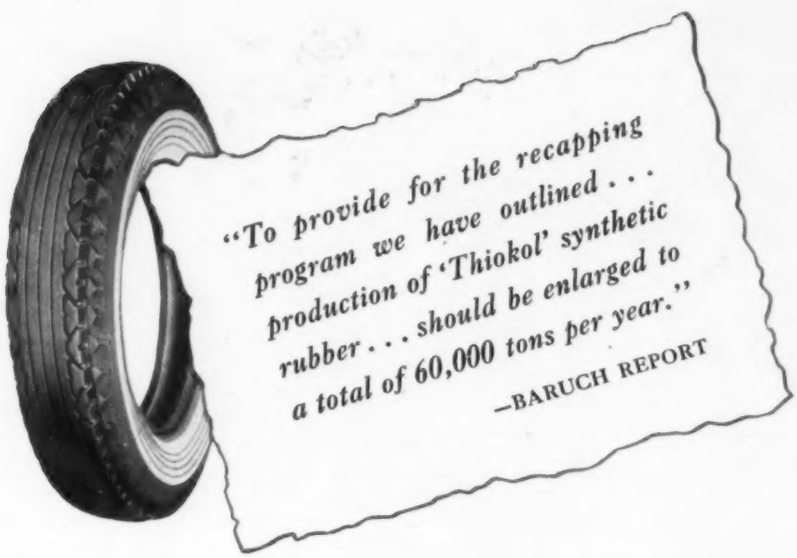
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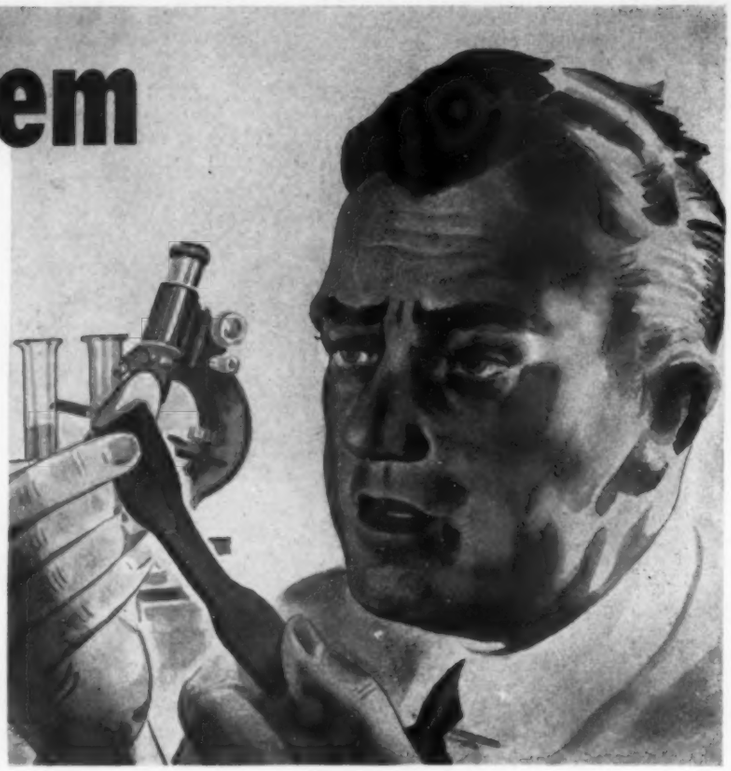
Reclaimed Rubber



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FACTS YOU SHOULD KNOW ABOUT COMPOUNDING

BUNA S

(G. S. R.)

The Thiuram and Dithiocarbamate type accelerators give different characteristics with Buna S than with natural rubber. These may be summarized as follows:

1—LONG CURING RANGE—A broad plateau effect which maintains physical properties over a long time of cure.

2—HIGH TENSILES—Uniform over the cure range—slight changes in modulus and elongation after maximum tensile is reached.

3—BRITTLENESS—Does not increase with progressive curing.

4—DELAYED ACTION—Permitting safe processing without loss of curing time.

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with Naugatuck chemicals

Naugatuck Chemical

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The **RUBBER AGE**

VOL. 52, No. 1 **OCTOBER, 1942**

The Compounding and Processing of Government Synthetic Rubber

BY C. A. CARLTON and E. B. REINBOLD

Development Department, J. M. Huber, Inc., New York

THE data in this report summarizes the work completed during the past few months on Buna S compounding. Two highly important subjects, *viz.*, flex crack growth and heat embrittlement are not covered in this report due to lack of sufficient conclusive data. These subjects are being studied thoroughly using newly developed test methods and will be reported on at a later date.

1. Introduction

The Government Synthetic Rubber being sold by the Rubber Reserve Company is an emulsion co-polymer of butadiene (CH_2:CH · CH:CH_2) and styrene (C_6H_5 · CH:CH_2) with a specific gravity of 0.93 to 0.94. The material is more commonly known as Buna S. The material made in Government plants will use standardized materials and a standardized process which should result in a product of uniform quality.

The materials used to obtain the data in this report were purchased from the Goodyear Tire & Rubber Company, Hycar Chemical Company, Stanco Distributors, Inc., and Xylos Rubber Company. Although most of the data presented was obtained before the polymer was standardized, it is believed that it will be generally applicable to the G.S.R. sold by the Rubber Reserve Company. The actual materials used are indicated in each case.

II. Non-Polymer Constituents

In addition to the butadiene-styrene co-polymer, G.S.R. contains free fatty acid, soap, antioxidant and mineral matter. No specifications have as yet been issued by the Rubber and Rubber Products Branch of WPB covering the non-polymer constituents but recommended test methods for the determination of acetone extract, heating loss (105° C.), fatty acid, soap and ash are given in a WPB release dated September 1, 1942, pages 111-3 and 111-4. A test formula, milling, curing and testing procedure together with stress-strain specifications are given on pages 111-2 of the same release.

The materials we have worked with have shown acetone extracts from 3.0% to 9.2% and ash from 0.47% to 1.33%. They contain from 2 to 3% of antioxidant of the phenyl beta naphthylamine or BLE type. Acetone extract and ash data is as follows:—

	Acetone Extract	*Ash*
Goodyear Chemigum IV ...	8.20	0.60
Hycar OS-20	3.40	0.55
Hycar OS-30	7.02	1.33
Hycar TT	6.00	0.47
Stanco Buna S	3.05—5.25	1.0—1.11
Xylos Buna S	8.3 —9.2	.86

TABLE I—EFFECT OF TEMPERATURE OF MILLING ON PLASTICITY AND RECOVERY OF BUNA S

Milling Temp.	Plasticity and Recovery		
	Hycar TT	Stanco Buna S	Xylos Buna S
Unmilled	1.04-.32	1.41-.64	1.64-.90
100° F.	1.00-.29	1.28-.38	1.27-.31
120° F.	1.13-.36	1.38-.47	1.30-.33
160° F.	1.13-.35	1.42-.46	1.32-.35
180° F.	1.17-.40	1.47-.41	1.35-.37

III. Processing

A. *Plasticity:*—Measurements made on the Williams-DuPont parallel plate plastometer show Buna S to be softer than natural rubber. Buna S does not respond to mastication as does natural rubber. Table I shows the effect of temperature of milling on the plasticity and recovery of three lots of Buna S. Note that milling has had very little effect on Hycar TT except to stiffen it slightly at the higher milling temperatures. All three materials produce best plasticity when milled at 100° F. and stiffen with increase in milling temperature.

In spite of the fact that milling produces little change in plasticity, a radical change has taken place which can be shown by swelling the materials in chloroform or benzene. The unmilled material swells but does not disperse. One 10-minute mastication at 100° F. produces a thick grainy dispersion. Three to four 10-minute mastications produce a smooth cement. By the addition of 1% RPA No. 3 to the Buna S a smooth cement can be made with two 10-minute mastications.

B. *Mixing Procedure:*—Buna S requires more mechanical work to put it in shape for factory processing than does natural rubber. This additional work can be either premastication of the Buna S itself or remilling of the finished compounds.

Our own laboratory results indicate that all compounds should be prepared from unmasticated Buna S. In the case of tire treads, it is advisable to make a masterbatch to contain all the softeners that are to be included in the final batch. For best dispersion the carbon black and zinc oxide should be added first and the stearic acid and other softeners last. The carbon black should be added slowly, particularly at the start of the mixing cycle. Remilling of the original mix produces excellent pigment dispersion.

All mixing and remilling should be done at as low a temperature as possible. If mixing temperatures rise above 200° F., the physical properties of the compound are depreciated. Cooling water should be used throughout the mixing and remilling cycles. Close mill settings are desirable.

C. *Tubing Procedure:*—Buna S compounds extrude slower than natural rubber compounds and more heat is generated. Screw speeds must be reduced and the compound must be well masticated to produce tread edges that will not tear. The tube machine barrel should be kept as cool as possible and a hot die used. Buna S treads shrink much more than natural rubber treads, so that good cooling facilities are needed.

D. *Calendering Procedure:*—Well plasticized Buna S compounds calender in about the same manner as natural rubber compounds. Somewhat lower roll temperatures should be used.

IV. Compounding

A. *Zinc Oxide:*—Like natural rubber, Buna S requires zinc oxide for activation of the accelerators used. Amounts from 3 to 5% are sufficient. When used in activating amounts only American and French process oxides produce practically identical results.

B. *Sulfur:*—Due to its lower degree of unsaturation, Buna S requires less sulfur for vulcanization than does natural rubber. Compounds that will be subjected to heat and flexing in service should carry from 1.50 to 2.25 parts sulfur per 100 parts of Buna S. Higher sulfur ratios produce lower hysteresis loss but the curing range is very short and the compounds become short and brittle when subjected to heat.

Elongation drops quite rapidly with increase in sulfur content. Maximum tensile is produced at sulfur ratios of 2.5 to 3.0.

C. *Stearic Acid:*—Conflicting statements have appeared in the literature regarding the need for stearic acid in Buna S compounds. G.S.R. contains substantial amounts of free fatty acid and soap, but further addition of stearic acid may be advisable to reduce heat generation. Hycar OS-20 is practically free from both fatty acid and soap so this material was used to investigate the effect of stearic acid on the physical properties of a tread compound. The results are shown in Table II.

SUMMARY OF TEST CONDITIONS

Plasticity: Measured on Williams-DuPont Parallel Plate Plastometer at 85° C. Data expressed in tenths of inches at the end of three minutes. Milling time—10 minutes.

Stress: Taken on 60-minute cure and expressed in pounds per square inch.

Tensile: Average and maximum, as indicated. Expressed in pounds per square inch.

Elongation: Taken on 60-minute cure (except as noted in Table II) and expressed in percentage of original length.

Abrasion Resistance: Average of 60 and 75-minute cures. Data obtained on Huber-Goodyear Angle Slip Abrader using 16° angle and 32 pounds load. Expressed in terms of percentage.

Abrasion Loss: Average of 60 and 75-minute cures. Data obtained on Huber-Goodyear Abrader and expressed in terms of cubic centimeters per hour.

Shore Hardness: Taken on 75-minute cure of abrasion test piece.

Heat Generation: Taken on 90-minute cure. Data obtained on St. Joseph Flexometer using 590 pound load and .150-inch horizontal deflection in Tables II, VII and VIII and 498 pound load and .130-inch horizontal deflection in Tables III, IV, V and VI. Temperature measured at geometric center of test piece at end of 45 minutes running time.

Energy Rebound: Taken on 90-minute cure. Data obtained on Scott-Goodyear Pendulum using 15° initial angle.

Tear Resistance: Average of five best cures using kidney-shaped test piece. Data expressed in terms of percentage in Tables II, VI and VII and in pounds per inch thickness in Tables IV and V.

TABLE II—EFFECT OF STEARIC ACID ON HYCAR OS-20

Test Recipe

Hycar OS-20	100.
Wyex	40.
Zinc Oxide	5.
Sulfur	2.
Stearic Acid	Variable
SDO #10	5.
Captax	1.
DOTG	.2
Curing Temperature	287° F.

Stearic Acid	Stress @ 300% (lbs./sq. in.)	Average Tensile (lbs./sq. in.)	Elongation (%)	Abrasion Resistance (%)	Shore Hardness	Heat Generation (°F.) (30 min.)	Energy Rebound (%)	Tear Resistance (%)
0	1020	1780	440	100	55	389	56.0	100
1	1230	2170	453	107	58	386	57.1	121
2	1230	2380	482	117	60	372	58.1	127
3	1230	2510	491	121	61	354	59.1	132
4	1220	2550	488	129	62	341	60.1	135
5	1270	2325	485	131	63	331	60.8	138

It seems evident that Buna S which is free from fatty acid and soap requires not less than 3 parts stearic in conjunction with 40 parts Wyex black for best results. Heat generation decreases and energy rebound increases with increase in stearic acid content up to and including 5 parts. Likewise, resistance to abrasion and tear resistance increase with increase in stearic acid content.

The WPB Bulletin states that "with about 40 to 50 parts of channel black by weight on synthetic, stearic acid is desirable up to a maximum of about 2.5%".

D. *Acceleration:*—Buna S requires more acceleration than natural rubber to cure at the same rate. The thiazole accelerators are recommended as best, particularly as regards heat generation and resistance to abrasion.

When used alone accelerators such as Captax, Altax and Santocure can be used in amounts from 1.5 to 2.0 parts. When activated with such materials as DOTG the total acceleration should generally be from 1.25 to 1.5 parts.

Compounds containing channel black require more acceleration than those containing furnace blacks or soft blacks. A tread compound containing 40 parts Wyex channel black accelerated with 1.0 parts Captax and 0.2 parts DOTG reaches best cure in 45 to 60 minutes at 287° F.

Buna S compounds do not scorch readily and therefore it is possible to use relatively high acceleration.

TABLE III—COMPARATIVE CHARACTERISTICS OF WYEX AND FURNACE BLACK OVER A SERIES OF LOADINGS IN A BUNA S TREAD STOCK

Test Recipe

Buna S	100.
Black	0 to 60.
Zinc Oxide	5.
Sulfur	2.
Stearic Acid	2.
SDO #10	5.
MBT	1.
DOTG	.2

Curing Temperatures:

Wyex	287° F.
Furnace Black	274 °F.

Parts Black	Tensile @ Break		Abrasion Loss		Heat Generation* (°F.)		Energy Rebound (%)	
	Wyex	Furnace	Wyex	Furnace	Wyex	Furnace	Wyex	Furnace
0	180	180	402	402	(3)	(3)	72.1	72.1
10	330	300	107	118	(4)	(4)	69.8	71.3
20	790	490	41	58	199 (7)	189 (5)	68.3	70.0
30	1540	700	23	44	265	231	67.0	69.3
40	2460	1100	16	33	282	251	64.0	67.8
50	2600	1320	12	29	306	255	60.5	66.6
60	2920	1510	10	25	333	259	57.0	64.8
70	....	1730	..	22	...	263	...	64.5

* Figures in parentheses express time in minutes at which blowout occurred.

TABLE IV—COMPARISON BETWEEN VARIOUS PIGMENTS ADDED TO A BUNA S COMPOUND CONTAINING 30 PARTS OF WYEX

Test Recipe

Hycar TT	100.
Wyex	30.
Zinc Oxide	5.
Sulfur	2.
Stearic Acid	2.
SDO #10	5.
Captax	1.
DOTG	.2

Curing Temperature—267° F.

Pigments Added

Zinc Oxide	63.5
Gastex	20.
P-33	20.
Thermax	20.
Suprex White	30.5
Paragon Clay	29.4
Aluminum Hydrate	26.6
Kalvan	30.
Silene	25.7

Note: Pigments added are equal to 20 parts of carbon black on a volume basis, using a specific gravity of 1.77 for carbon black.

Pigment	Stress @ 400%	Maximum Tensile	Elongation	Heat Generation	Tear Resistance
Zinc Oxide	1260#	2250#	543%	275°F.	220#
Gastex	1560	2250	542	276	250
P-33	1380	2270	585	275	245
Thermax	1320	1960	537	275	205
Suprex White	920	1840	612	306	170
Paragon Clay	720	2070	572	341	175
Aluminum Hydrate	1220	1510	445	309	200
Kalvan	1020	1520	500	320	215
Silene	1140	1560	450	360	220

E. *Antioxidants:*—G.S.R., as received, contains 2% of antioxidant. The material ages very well both in the oxygen bomb and Geer oven, so further additions of antioxidant are not necessary.

Oxygen bomb and Geer oven aging tests were run on the test recipe shown in Table II using 2 parts stearic acid and Hycar TT, Stanco Buna S and Xylos Buna S. After 96 hours in the oxygen bomb at 80° C. the tensile depreciation for the three materials averaged 4%. A natural rubber tread would have been destroyed by such treatment.

Geer oven aging increases modulus and decreases elongation with practically no change in tensile.

F. *Pigmentation:*—Buna S in the pure gum state is practically worthless. The tensile strength is around 200 pounds per square inch and the material is almost devoid of tear resistance.

The black pigments are by far the best, with channel black superior to the furnace blacks as regards tensile, resistance to abrasion and resistance to tear. It requires about 30 parts channel black, or from 40 to 50 parts of furnace black (of the Gastex type) to produce satisfactory physical properties.

Table III compares Wyex and a furnace black over a series of loadings in a Buna S tread stock.

Table IV shows the effect of adding various pigments to a Buna S compound containing 30 parts Wyex. The data shows clearly that the black pigments and zinc oxide generate the least heat.

Table V compares mixtures of Wyex and Gastex using total loadings of 30, 40, 50 and 60 parts of black.

The Wyex type channel black is most suitable for use in Buna S. It wears as well as the harder blacks, generates much less heat, and is easier to process.

Truck tire treads should carry from 40 to 50 parts black and passenger tire treads from 45 to 50 parts black per 100 parts synthetic. Tire carcass and inner tube compounds should carry from 25 to 30 parts Wyex or 40 to 50 parts furnace black or appropriate mixtures of the two blacks.

G. *Softeners:*—The materials that are very effective in softening natural rubber have very little effect on the plasticity of Buna S as measured by the parallel plate plastometer. However, softeners are necessary to aid in incorporating and dispersing pigments, to lower temperature during processing, and to aid in extrusion.

The softeners vary widely in their effect on the physical properties of Buna S compounds, particularly as regards resistance to abrasion and heat generation. In general, the coal tar materials produce high modulus, good tensile, good resistance to abrasion, low heat generation and high energy rebound. Acidic materials, such as pine tar, pine fatty acid pitch, gum of turpentine and wood rosin, give low modulus, good tensile, high elongation, poor resistance to abrasion, high heat generation and low energy rebound. Table VI compares a number of softeners in a Buna S tread compound, using 10 parts softener per 100 parts synthetic. Table VII compares a number of softeners in the same compound using 5 parts softener.

The data shows clearly that the liquid coal tar materials show the lowest heat generations and the best resistance to abrasion. Tread compounds will require

TABLE V—MIXTURES OF WYEX AND GASTEX IN BUNA S USING TOTAL LOADINGS OF 30, 40, 50 AND 60 PARTS OF BLACKS

Test Recipe

Hycar OS-30	100.
Zinc Oxide	5.
Sulfur	2.
Stearic Acid	2.
SDO #10	5.
Captax	1.
DOTG	.2
Black	As Shown

Curing Temperature—267° F.

Pigment—Gastex	Pigment—Wyex	Stress @ 300%	Maximum Tensile	Elongation	Heat Generation	Tear Resistance
30	..	840#	960#	315%	223°F.*	100
20	10	720	1100	385	242	110
10	20	650	1400	387	254	130
..	30	620	1560	515	269	145
40	..	....	1360	288	232	135
30	10	950	1650	410	247	145
20	20	900	1660	380	269	165
10	30	760	1960	500	284	185
50	..	1420	1710	320	241	150
40	10	1320	1970	390	255	175
30	20	1180	2200	450	269	195
20	30	1020	2280	500	287	210
60	..	1780	2100	345	250	175
50	10	1640	2010	325	259	200
40	20	1440	2190	410	275	220
30	30	1340	2300	450	298	225

* Blowout in 15 minutes.

TABLE VI—A COMPARISON OF VARIOUS SOFTENERS IN A BUNA S TREAD COMPOUND

Test Recipe

Hycar OS-30	100.
Wyex	40.
Zinc Oxide	5.
Sulfur	2.
Stearic Acid	2.
Captax	1.
DOTG	.2
Softener	10.

Curing Temperature—287° F.

Softener	Stress @ 400% (lbs./sq.in.)	Maximum Tensile (lbs./sq.in.)	Elongation (%)	Abrasion Resistance (%)	Heat Generation (° F.)	Energy Rebound (%)	Tear Resistance (%)	3 Minute Plasticity
SDO #10	1820	2500	480	100	272	64.8	100	1.56
Gum of Turpentine	980	2660	660	64	321	57.0	110	1.52
Tarzac	1560	2400	530	82	292	58.7	117	1.54
Guayule Resin	1360	2500	570	78	301	57.8	116	1.60
Piccocizer "30"	1920	2400	450	103	276	64.2	99	1.56
Paraflux	1220	2320	472	81	292	61.3	108	1.33
Circo Light Oil	1700	1720	407	102	279	63.9	90	1.55
Wood Rosin	780*	2490	827	62	334	53.7	112	1.62
Pine Tar Oil	840	2460	545	64	301	60.6	122	1.65
Trexol	1650	2160	435	89	277	63.2	85	1.53
Velogum	1740	2250	475	76	298	59.1	99	1.80
Mineral Rubber	1350	2480	570	78	293	59.4	113	1.75
Pine Fatty Acid Pitch	980	2490	663	64	301	58.6	117	1.55
Crude Tall Oil	1000	2450	650	70	299	59.2	108	1.48
BRT #3	1220	1790	375	96	279	61.3	94	1.59
BRT #7	1220	1860	337	92	279	61.3	96	1.74

* at 500%.

from 10 to 15 parts softener and carcass compounds from 5 to 10 parts. As with natural rubber, the lower the softener the better the properties of the cured compound.

V. Physical Properties of Buna S Compounds

A. *Stress-strain:*—As previously stated, pure gum Buna S compounds produce very poor physical properties, the tensile being only about 200 pounds per square inch. When pigmented with channel black the modulus of Buna S is comparable with that of natural rubber, but tensile and elongation are much lower. See Compounds A and E, Table VIII.

B. *T-50:*—The T-50 test is of no value in determining the state of cure of Buna S compounds since the T-50 temperature changes very little over a wide range of curing time.

C. *Abrasion Resistance:*—Buna S tread compounds are comparable to natural rubber compounds as regards resistance to abrasion. The data in Table VIII shows the straight Buna S compound to be 96% as good as the straight smoked sheet compound. Actual road tests have shown Buna S treads to be from 95 to 105% as good as natural rubber treads.

D. *Heat Generation:*—Buna S tread compounds generate much more heat than natural rubber compounds. This is illustrated by the data in Table VIII. Buna S becomes short and brittle when subjected to heat and flexing. It is extremely important to use every compounding means to reduce heat generation as much as possible.

E. *Energy Rebound:*—Buna S compounds give a much lower energy rebound than natural rubber compounds. At the same time they have a higher dynamic hardness but about the same Shore hardness as natural rubber compounds. (See Table VIII).

F. *Tear Resistance:*—Buna S compounds have poor resistance to tear in comparison with natural rubber compounds. This is particularly true at elevated temperatures. (See Table VIII.)

G. *Flex Cracking:*—To date we have been unable to develop a satisfactory laboratory method for the determination of the flex cracking characteristics of Buna S compounds. We have found that unaged compounds have very good resistance to flex cracking, but heat-aged compounds flex crack badly. The cracking that develops is of a particularly insidious character in that once cracking starts it goes completely through the test piece very rapidly.

In one series of tests twenty Geer oven-aged test pieces were put on our DuPont flexer. At the end of 55 hours one test piece was cracked completely through. At the end of 153 hours nine of the test pieces showed no cracking whatever.

It is apparent that small flaws in the test pieces have a very marked effect. No doubt the cracks obtained on tires in service are started by stone cuts. Once started the cracks go through to the carcass in a relatively short time.

It is evident that laboratory flex cracking tests to be of value must be run at an elevated temperature.

VI. Blends of Buna S and Natural Rubber

Buna S compounds are nearly devoid of tack. To

TABLE VII—A COMPARISON OF VARIOUS SOFTENERS IN A BUNA S TREAD COMPOUND

Test Recipe

Hycar OS-30	100.
Wyex	40.
Zinc Oxide	5.
Sulfur	2.
Stearic Acid	2.
Captax	1.
DOTG	.2
Softener	5.

Curing Temperature—287° F.

Softener	Abrasion Resistance	Heat Generation	Energy Rebound	3 Minute Plasticity
None	100%	312°F.	65.3%	1.68
SDO #10	89	318	64.7	1.70
Bardol	89	321	63.7	1.64
Bardol B	90	319	64.4	1.64
BRV	87	334(35')	62.6	1.70
BRH #2	77	322	62.9	1.66
Pine Tar	66	345	62.2	1.74
Cumar RS	84	330	63.1	1.68
Cumar P-10	87	336	63.1	1.69
Cumar P-25	88	336	63.1	1.76
Trexol	89	323	63.9	1.72
SRO	90	331(25')	63.6	1.62
Nevoll	89	319	63.4	1.67
Neville Resin R-29	77	337	62.0	1.67
Neville X-1 Resin Oil	79	362	61.7	1.65
Dipolymer Oil	90	323	63.9	1.64

date there seems to be no remedy for this situation except to blend natural rubber with the Buna S. Twenty parts natural rubber blended with 80 parts Buna S gives a fair degree of tack and 30 parts natural rubber with 70 parts Buna S does a good job.

There is a decided difference between Buna S which is free from fatty acid and soap and G.S.R. which contains both as regards tack. We have found that Hycar OS-20 which is practically free from fatty acid and soap can be made somewhat tacky by the addition of wood rosin and pine fatty acid pitch. These same materials are quite useless with Buna S containing soap. Hycar OS-20 plus 3 parts stearic acid and 10 parts of the tackifier mentioned above, produce a good tack

TABLE VIII—COMPARISON OF MIXTURES OF BUNA S AND NATURAL RUBBER WITH STRAIGHT BUNA S AND STRAIGHT SMOKED SHEET

Curing Temperature—280° F.

	A	B	C	D	E
Smoked Sheet	100.	75.	50.	25.	.....
Buna S (Ms-132)	...	25.	50.	75.	100.
Wyex	40.	40.	40.	40.	40.
Zinc Oxide	5.	5.	5.	5.	5.
Sulfur	2.75	2.5625	2.375	2.1875	2.
Stearic Acid	4.	3.5	3.	2.5	2.
SDO #10	2.5	3.125	3.75	4.375	5.
Captax	.875	.91	.9375	.97	1.
DOTG	...	.05	.1	.15	.2
Stress @ 300%—lbs./sq. in.	1320	1280	1260	1250	1260
Tensile (lbs./sq.in.)	4260	3740	3200	2810	2440
Elongation—%	642	618	550	515	447
Abrasion Resistance—%	100	98	92	92	96
Heat Generation—° F.	263	295	308	325	351
Energy Rebound—%	75.0	67.3	64.0	61.8	59.8
Tear Resistance—%	100	103	78	55	35

showing that the soap is the material that is destroying the tack.

The data in Table VIII shows the physical properties to be obtained with blends of Buna S and natural rubber.

It would appear that it will be necessary to use natural rubber in conjunction with Buna S in the carcass stocks of large size truck tires in order to reduce heat generation and to supply tack sufficient for successful tire building. This will be true at least until such time as we learn how to overcome the heat embrittlement to which the present Buna S compounds are subject.

Reclaimed rubber blended with Buna S improves tack but very little. The physical properties suffer radically, more so than when natural rubber is diluted with reclaim. Blends of reclaim and Buna S should be avoided as more value can be obtained by using the materials separately.

Ambidex—A New Activating Plasticizer

AMBIDEX, a high pressure condensation product which is absolutely stable at temperatures involved in the preliminary processing and in the vulcanization of rubber, has been added to the line of compounding ingredients featured by the Binney & Smith Co., 41 East 42nd St., New York City. It is said to be more effective as a softening and dispersing agent than the free fatty acids generally employed in rubber compounding and many times more efficient as an activator of thiazole and thiuram accelerators. It is significant that the manufacture of this new cure-activator does not involve the use of aniline or of any other aromatic intermediate, aliphatic compounds being exclusively employed in its synthesis.

The new cure-activator can be incorporated at any desired point in the course of mixing without danger of decomposition. If added directly to the rubber at the beginning of the mix, it does not inhibit peptizing materials, but does provide a desirable additional plasticizing effect. It can be added equally well at a later stage with the fillers, in which case it assists dispersion. Being highly soluble in rubber, it has excellent wetting efficiency.

Where desirable, higher ratios of Ambidex can be used than are required merely for acceleration in order to impart improved resistance to aging. Showing extremely flat modulus curves over a wide range of cures, this activator can be employed safely in relatively large percentages to enhance processing without danger of over-curing. Ambidex requires only a minimum of activating zinc oxide and it also provides highly efficient cure-activation even when employed in conjunction with reduced ratios of free fatty acid.

The Nitroparaffin Derivatives in the Compounding of Rubber

Applications Include Use as Heat Sensitizer for Latex and Anti-Gelling Agent for Rubber Cements

THE Nitroparaffins and their derivatives developed by the Commercial Solvents Corporation are already being successfully employed in the manufacture of pharmaceuticals, dyestuffs, insecticides, rubber chemicals, textile chemicals and resins. These materials are said to be much more than just another group of interesting compounds, since they reveal an entirely new field of organic chemistry—a field which promises to rival the development of the coal tar derivatives both in magnitude and in scope. New uses are constantly being found for the Nitroparaffins, particularly for their derivatives, including several in rubber compounding. The two specific uses described below are based on technical data furnished by the manufacturers.

Heat Sensitizer for Latex

One of the five Nitrohydroxy derivatives now in production is 2-Nitro-2-methyl-1-propanol. This has been found to be an excellent heat sensitizer for latex and at ordinary room temperatures the sensitized latex is stable for a week or more. In compounding latex for molded articles, most producers have found it necessary to add a sensitizer to the accelerated mix in order to speed up gelling. The sensitizers commonly used for this purpose are inorganic salts, such as ammonium nitrate, ammonium sulfate and sodium fluosilicate, which offer satisfactory sensitization when everything is running smoothly. In case production has to be interrupted for any reason, however, a mix containing one of these sensitizers may gel even at room temperature and thus become a total loss.

Latex dispersions sensitized with 2-Nitro-2-methyl-1-propanol have the advantage that they gel rapidly at elevated temperatures, yet they are stable against gelling for a week or more at ordinary room temperatures. Therefore, batches sensitized with this nitro-alcohol can be held for a considerable period of time without fear of preliminary gelling in the event of equipment breakdowns or any other unexpected production shutdowns. Furthermore, Nitro-methyl-propanol has no effect on the aging of gelled stocks, nor does it seriously affect the rate of cure of compounded latices. This NP derivative is water-soluble and thus may be added to a mix as an aqueous solution. The following table shows the effectiveness of 2-Nitro-2-methyl-1-propanol as a sensitizer for typical latices such as Heveatex and Lotol:

EFFECT OF VARYING PROPORTIONS OF NITRO-METHYL-PROPANOL ON GELLING TIME*

Parts Nitro-methyl-propanol per 100 parts rubber—dry weight	Gelling time at 80° C. Heveatex	Lotol
0	8 min.	Did not gel in 6 hrs.
1	6 min.	.....
2	5 min.	30 min.
3	4 min.	10 min.
4	3½ min.	7 min.
5	3 min.	5 min.
6	.....	4 min.

* Latex (60% suspension) ..... 167 gm.
Vulcanizing dispersion ..... 10.2 gm.

The Nitro-methyl-propanol should be added as a 25% aqueous solution to the dispersion, which is stirred vigorously throughout the addition; these precautions will eliminate any possibility of local coagulation.

The vulcanizing dispersion used in obtaining the results shown above was ground in a ball mill to a water-thin consistency. Its composition was as follows:

COMPOSITION OF VULCANIZING DISPERSIONS

	Parts by Weight
Zinc Oxide	2.0
Sulfur	0.6
Agerite White	1.0
Butyl Zimate	1.0
Latex Telloy	0.5
Darvan	0.204
Casein	0.153
Caustic Soda	0.100
Water	4.643
	10.200

This dispersion contains Butyl Zimate as an accelerator but Nitro-methyl-propanol gives equally good results with Captax and guanidine-type accelerators.

The following formula is suggested for making latex sponge. The amount of Nitro-methyl-propanol employed is determined by test.

	Parts by Weight
Latex (60% suspension)	167.0
Vulcanizing dispersion	10.2
25% aqueous soap solution	4.0
Nitro-methyl-propanol	As required

With this formula a trace of pine oil—1 part in 10,000—will help stabilize the foams. As with all latex foams, lead-free zinc oxide should be used in the vulcanizing dispersion, since traces of lead tend to break such foams. The two parts by weight of zinc oxide per hun-

dred parts of dry rubber, as shown in this formula, is about the maximum for good foam stability.

As has been previously indicated, latices sensitized with Nitro-methyl-propanol have the unusual advantage of gelling very quickly at 80° to 90° C., yet remaining stable for a week or more at room temperatures. If it is desired to store such latices, they will not gel even for extended periods of time when kept at around 15° C. Thus the use of Nitro-methyl-propanol offers insurance against production losses due to premature gelling of sensitized latex mixes.

Anti-Gelling Agents for Cements

The application of ultra-accelerators, such as zinc dibutyl dithiocarbamate and polybutyraldehyde-aniline, to vulcanizing rubber cements has been seriously handicapped by the formation of irreversible gels. Because of this gel formation it has been necessary heretofore to formulate these cements in two parts which are mixed together just before use. One part usually consists of a solution of rubber, zinc oxide, and sulfur, and the other part a solution of rubber plus the accelerator, with or without zinc oxide. The inconvenience of such two-part cements is obvious.

Now, this type of rubber cement can be made in ready-to-use form without fear of gelling over long storage periods. Results obtained so far indicate 1-Chloro-1-nitropropane to be the best of the five available Chloronitroparaffins for this purpose. The following mixture contains two of the most active accelerators and yet does not gel when the proper amount of 1-Chloro-1-nitropropane is present:

	Parts by Weight
Rubber	100.0
Zinc Oxide	5.0
Sulfur	2.5
Zinc dibutyl dithiocarbamate	0.5
Polybutyraldehyde-aniline	0.5

The above components are milled together on cold rolls until thoroughly dispersed and are then immediately dissolved in a mixture of the desired solvent and 1-Chloro-1-nitropropane. Gelling is completely inhibited by adding an amount of 1-Chloro-1-nitropropane equal to the weight of the dry rubber. Cements thus formulated are still unchanged after over a year's storage at room temperature, and after over six months at 50° C. The bonding power of the cement is not affected by the Chloronitroparaffin although the rate of cure is decreased somewhat by the retention of traces of anti-gel in the film.

Tests indicate that many loading agents can be used in the presence of the Chloronitroparaffins. However, these derivatives should not be used with strong bases like diphenyl guanidine, lime, and magnesia, since such bases destroy the anti-gelling effect.

Effect of Broken Glass on Tires

BECAUSE of the increasing possibilities of tire punctures and blow-outs from broken glass in England, resulting from the bombing raids, some of the city streets having been littered with glass from bomb-shattered windows, the British Secretary of War some time ago requested the National Technological Civil Protection Committee to conduct a survey to determine the effect of broken glass on tires. The recently-submitted report of the committee follows:

Tests have been made in England on the effect of broken glass on automobile tires. From these exhaustive experiments and actual experience, it can be said that even after a severe raid there is no serious danger that motor transport will be unable to use city streets because of the presence of broken glass and nails.

A special test was conducted in order to study the effect of broken glass on unprotected tires, for which two vehicles were used: a towing vehicle and a large trailer pump. The tires were in very good condition, and under a pressure of 30 lbs.

At first, a large quantity of broken plate glass was placed on somewhat soft ground. Later, a considerable amount of glass was spread over a concrete base, which was so situated as to cause several bumps to the vehicles coming on the glass, thus approaching closely the severest conditions they may have to meet after air raids.

The vehicles passed 21 times over the glass-covered areas. The tests included also sudden stops, starts, and skids. After each run the tires were carefully examined. It was found that small pieces of glass were picked up, mostly in the treads of the tires, but, with very few exceptions, no tire was cut very much by the glass.

It was also established that traversing over the glass at 5 miles per hour, the tires picked up more fragments than when passing at 15 miles per hour.

Vehicles with rubber tires can safely pass over roads covered with broken glass at speeds up to 15 miles per hour, provided the tires are in good condition, and the pressure recommended by the manufacturer is maintained.

It is recommended that after traveling over glass, the tires should be examined and brushed with a steel brush to remove any glass particles which may have been picked up, and, at the first opportunity, a thorough inspection of the tires should be made, and the imbedded glass removed from the rubber.

BUY

☆ UNITED STATES ☆

WAR SAVINGS

BONDS and STAMPS

A Proposed Method of Test for Identification of Rubber by Means of the Durometer

Method Is Suggested for Temporary Use Pending Development of New Instrument

WHEN the Hardness Test Section of Technical Committee A on Automotive Rubber of Committee D-11 on Rubber Products of the American Society for Testing Materials was originally formed, it was assigned the task of developing a portable rubber hardness testing device which would be more suitable and reliable than present instruments. Some progress has been made along this line of endeavor, but due to the present emergency it is impossible to bring the work to a conclusion. L. V. Cooper, in charge of testing laboratories for the Firestone Tire & Rubber Co., Akron, Ohio, is chairman of the Hardness Test Section.

In order that some standardization of rubber hardness evaluation might be possible in the meantime, the Section, on instructions from Technical Committee A, has drawn up a Proposed Method of Test for Indentation of Rubber by Means of the Durometer. In the proposed method, according to a report of the Hardness Test Section submitted by Mr. Cooper, the physical characteristics of an acceptable durometer and the proper procedure for its use are described. The committee plans to recommend this proposed method to the A.S.T.M. for publication later as an Emergency Standard. When conditions are more favorable, it is the intention of the committee to resume work on the original program.

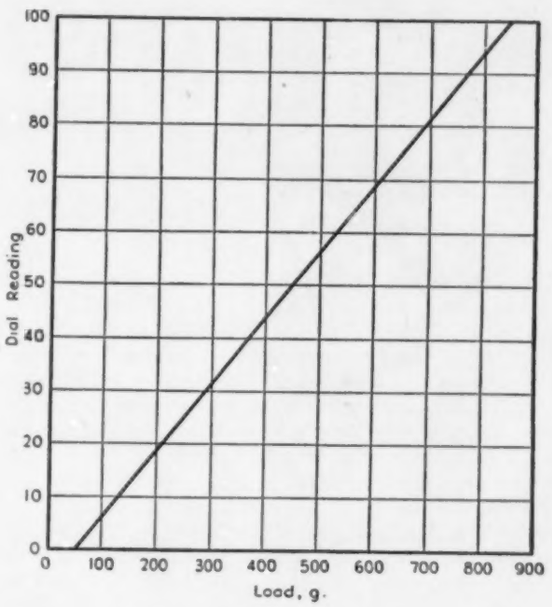


FIG. 2— Calibration Curve for Durometer Spring.

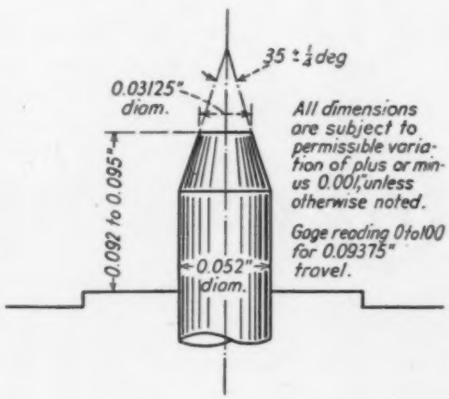

35 ± 1/4 deg
0.03125" diam.
All dimensions are subject to permissible variation of plus or minus 0.001" unless otherwise noted.
0.092 to 0.095"
0.052" diam.
Gage reading 0 to 100 for 0.09375" travel.

FIG. 1--Indentor Point for Durometer.

In his report Mr. Cooper stressed the point that the Hardness Test Section realizes that the durometer at best is a fragile instrument which is difficult to calibrate, but it is the instrument most generally in use. Satisfactory results may be obtained on a commercial basis with a reasonably correct durometer if it is checked at frequent intervals with a durometer that has been correctly calibrated and held as a standard. The Proposed Method of Test for Indentation of Rubber by Means of the Durometer follows:

Scope

1. This proposed method of test covers the procedure for determining the indentation of rubber by means of the durometer.

Apparatus

2. *(a) Indentor Point.*—The indentor point shall be made of hardened steel and shall conform to the shape and size shown in Fig. 1.

(b) Calibrated Spring.—The spring in the durometer shall be such that when it is calibrated in accordance with the procedure described in the paper on "The Standardization of Durometers" by Lewis Larrick (*A.S.T.M. Proceedings,* Vol. 40, p. 1239, 1940) the calibration curve shall conform to a straight line, one end of which is at zero dial reading and 50-g. load and the other end at 100 dial reading and 850-g. load, as shown in Fig. 2. A variation of plus or minus 4 g. from the straight line shall be permitted at any or all points.

Test Specimens

3. Test specimens shall be at least ¼ in. in thickness. Thinner samples may be plied up to obtain this thickness, but hardness determinations made on such specimens shall be considered only indicative and not definite. No hardness determination shall be made within ½ in. of the edge of the specimen and under no circumstances shall hardness determinations be considered practical unless the entire width of the bearing plate is resting on the specimen. A suitable hardness determination cannot be made on a rounded surface or on one that is narrower than the bearing plate.

Procedure

4. *(a) Method of Application of Durometer to the Specimen.*—The durometer shall be grasped between the thumb and the third and fourth finger, resting the index finger on top of the instrument. The durometer shall then be placed on the test specimen while keeping the base of the instrument parallel to the surface of the specimen. This method of application allows the seating of the plate around the indentor point flush with the test surface with a minimum amount of rocking.

(b) Pressure Application.—The test pressure applied shall be just sufficient to insure firm contact of the pressure plate with the test specimen.

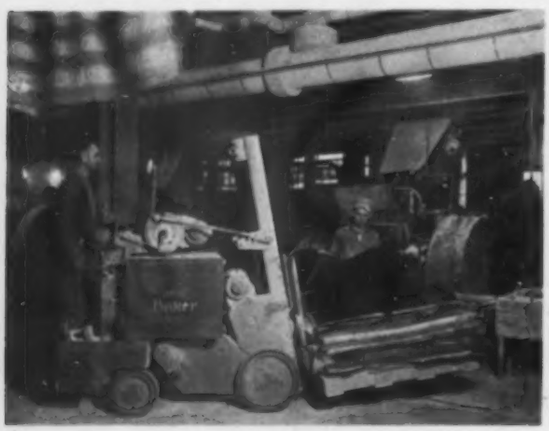
(c) Time of Reading.—The durometer indentation reading shall be taken as soon as the indicating hand of the dial comes to rest or, if this is not possible, at the moment when a definite change in needle speed is noted; but in no case shall the period of application of the test pressure be longer than 10 sec.

Fork Truck Effects Economies in Reclaimed Rubber Plant

ABOUT one year ago the Pequanoc Rubber Co., manufacturers of reclaimed rubber, purchased a 2,000-pound capacity fork truck for use in its Butler, N. J., plant. Observations made since the truck has been in use reveals that it has cut the time of box-car loadings in half, has conserved man-power, and, according to T. Mace, superintendent of the plant, paid for itself in savings within eight months. The truck is a product of the Baker Industrial Truck Division of the Baker-Rauland Co., Cleveland, Ohio.

Before the Baker Fork Truck was put to use, reclaimed rubber sheets in the Pequanoc plant were handled with four-wheel hand trucks which had to be loaded and unloaded singly for storage or shipment. When the sheets came off the mills they were placed on the hand truck which was wheeled several hundred feet to the warehouse and the sheets then taken off one at a time and piled on the floor for storage. The same procedure was followed when the sheets were shipped.

Present procedure at the plant, however, is to load the sheets as they come from the mills on pallets which are picked up by the Baker Fork Truck, carried to the warehouse, and piled two high on the pallets. When shipped, the truck picks up a pallet load from the warehouse and carries it right into the box-car, or truck, placing them in position two-high. The ultimate customer also saves time and expense by removing the pallet loads from the carrier with his own power truck equipment. The accompanying photographs depict the use of the truck.



Sheeted reclaim is piled on pallets which are easily picked up by the fork truck.

Carried by truck to the warehouse, the sheets are piled two high on the pallets.

Producing Butadiene by the Houdry Method

By C. H. THAYER[1], R. C. LASSIAT[2], AND E. R. LEDERER[3]

Arguments for and against the various methods of producing butadiene, vitally needed for the synthetic rubber program, have resounded in Congressional corridors for many months. There is no argument with the statement that most of the processes suggested have some merit and certain advantages in their favor. Surprisingly, little information on the various processes —both suggested and adopted—has appeared in the technical literature. Accordingly, we have made preparations for publishing a symposium on the subject of producing butadiene from the various known sources. In the following article the Houdry combined two-stage dehydrogenation catalytic process, which utilizes butane, is discussed. Subsequent articles will cover the manufacture of butadiene from other petroleum fractions and from the three intermediate products of grain—butyl alcohol, ethyl alcohol and butylene glycol. It must be remembered that these articles are subject to censorship prior to publication.—The Editor.

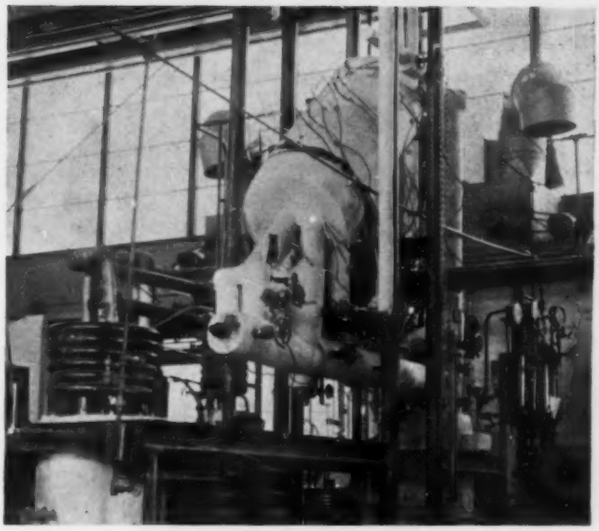
THE shortage of natural rubber caused by the war led logically to the application of the Houdry process to the production of butadiene. Houdry's research of catalytic processes since 1923 and experience gained in large scale cracking and aviation gasoline plants employing his process are fully utilized in the design of Houdry catalytic dehydrogenation plants for producing butadiene.

This article deals with Houdry's two-stage dehydrogenation process for the production of 15,000 tons of butadiene per year in each plant. Such a plant is now being built by the Sun Oil Company for the Defense Plant Corporation to supply butadiene to the Rubber Reserve Corporation. This size plant is admirably suited for smaller refineries and for natural gasoline and recycling plants where a sufficient supply of butane is available. It can be also erected in natural gas fields where butane is separated from natural gas, while the balance of the de-butanized gas may be piped away to serve as gas fuel or stored in the ground.

Economy of Material

The design of these small butadiene plants permits the use of 60% to 75% of material either existing at such plants or easily available as second hand equipment. Sun Oil has found sufficient material for the construction of its plant so that of the estimated gross expenditure for this project of $3,254,420 the actual value of the material to be used is $1,720,000, and only $313,686, or 18.2% of this amount, is represented by new critical materials requiring priority. The total weight of the material to be used in this project, excluding masonry and lumber, is estimated at 6,025 tons, of which 80%, or 4,822 tons, consists of existing or second-hand equipment, and only 20% of the weight of the total materials entering into the contemplated construction requires priority.

Another advantage of this process and design is that such a plant can be completed and placed in operation within six months after construction has started. After the war these plants may be converted into units for production of high octane gasoline and components of aviation gasoline at reasonable cost.



View of Houdry Butadiene Pilot Plant

TABLE 1—ESTIMATED COST, BASED ON ALL NEW MATERIAL, FOR A HOUDRY COMBINED TWO STAGE DEHYDROGENATION AND SINGLE STAGE PURIFICATION PLANT FOR PRODUCTION OF 15,000 TONS A YEAR OF BUTADIENE

I. Process Plants	
a. Dehydrogenation Plant	$1,902,825
b. Purification Unit	955,000
c. Auxiliaries—Services and Utilities	559,100
TOTAL	$3,416,925
II. General Administrative, Purchasing, Engineering & Development Expense	225,000
III. Grand Total	$3,641,925

(1) Chief Engineer, Sun Oil Co., Philadelphia, Penna.
(2) Houdry Process Corp., Philadelphia, Penna.
(3) Consulting Engineer, Sun Oil Co., Philadelphia, Penna.

Ample Supply of Feed Stock

Butane is used as charging stock, although a mixture of butane-butylene can be used and the first stage of the dehydrogenation process eliminated.

Butane, however, is preferred because it is available in large quantities in relatively pure form at refineries, as a by-product of alkylation processes for the manufacture of aviation gasoline, in natural gasoline and recycle plants. Furthermore, the use of butane does not reduce the raw material needed for the 100 octane aviation gasoline program as would be the case if butylene is used as feed stock for the production of butadiene.

A careful survey of the potential normal butane production at natural gasoline plants and refineries in the United States based on actual 1941 production figures published by the U. S. Bureau of Mines and published data for the first five months of 1942 permit the following estimate of potential n-butane production for the current and future years up to 1944 inclusive:

TABLE 2—MATERIAL REQUIREMENTS FOR HOUDRY COMBINED TWO STEP DEHYDROGENATION AND PURIFICATION PLANT FOR PRODUCTION OF 15,000 TONS/YEAR BUTADIENE

25% has been added to all items for contingency

		Weight—Tons		
		Dehydrogenation and Separation Unit	Purification Unit	Total
1.	Carbon Steel Plate	293	250	543
2.	Structural Steel	484	143	627
3.	Reinforcing Steel	63	19	82
4.	Steel Tubular Material	1015	360	1375
5.	Steel Forgings	68	38	106
6.	Forged Steel Valves	3	2	5
7.	Cast Steel Valves	234	38	272
8.	Cast Steel Castings	109	—	109
9.	Carbon Steel Bolts	10	3	13
	TOTAL CARBON STEEL	2279	853	3132
10.	Cast Iron Castings	42	34	76
11.	Cast Iron Castings (Heat resisting)	15	—	15
12.	Cast Iron Valves	25	13	38
	TOTAL CAST IRON	82	47	129
13.	27% Chrome Steel Plate	30	—	30
14.	Low Alloy Steel Bolts	10	3	13
15.	Cast Brass Valves	1	1	2
16.	Brass Tubing	19	—	19
17.	Brass and Bronze Plates and Bars	63	—	63
18.	Copper Cable and Bars	16	—	16
19.	Lead Cable Covering	6	2	8
	TOTAL NON-FERROUS MATERIALS	105	3	108
20.	Machinery	465	60	525
	(Compressors, exclusive of refrigeration)	2450 h.p.	470 h.p.	2920 h.p.
21.	Electric Motors, number	4	5	9
	(Exclusive of refrigeration)	295 h.p.	191 h.p.	486 h.p.
22.	Transformers, number	2	—	2
23.	Switch Gear, number	2	—	2
24.	Instruments and Controls	9	3	12
25.	Special Equipment (Cycle Timer, Etc.)	3	—	3
26.	Insulation	375	125	500
27.	Welding Rod—Alloy	3	—	3
28.	Welding Rod—Carbon Steel	24	8	32

TABLE 3—UTILITIES REQUIRED FOR A HOUDRY COMBINED TWO STAGE BUTADIENE PLANT AND PURIFICATION PLANT TO PRODUCE 15,000 TONS PER YEAR

Electric Power	33,600 kwh/day
Fuel Oil or Gas (80,200,000 btu/hr.)	309 bbls./day
Steam	2,000,000 lbs./day
Cooling Water Circulation	10,000 g.p.m.
Makeup Water for Cooling	300 g.p.m.

Note: If process steam is first expanded through drivers the above electric requirement may be correspondingly reduced. The electric power requirement includes refrigeration equipment. If steam or gas-driven refrigeration compressors or steam jet refrigeration is used, the power consumption may be reduced by 18,000 kwh per day.

From natural gas at gasoline plants	92,000 B/D
From cracking processes at renneries	36,700 B/D
Present in crudes run	50,400 B/D

Normal butane is, therefore, available to the extent of at least 175,000 barrels per day.

Due to the high yield of butadiene obtained from butane in the Houdry process, 44 plants of this type, charging each 677 barrels of butane or a total of about 30,000 barrels daily, can produce 660,000 tons of butadiene annually, sufficient for the final production of 880,000 tons of rubber, or the entire tonnage proposed at present by the Government to be produced from petroleum.

By making fullest possible use of existing equipment, an expenditure for new critical material of less than forty million dollars would suffice to build these plants. The first 300,000 tons of annual capacity of butadiene could be in operation within six to seven months and the total required capacity of about 600,000 tons within nine months after beginning of construction.

Design of Plant

All Houdry plants are designed to operate on very short on-stream periods. Each on-stream period is followed by a regeneration step, whereby carbon deposited on the catalyst is removed and the catalyst maintained in a very active condition. The useful life of the catalyst is expected to be more than six months. Due to the relatively pure form of the charging stock the carbon deposit is comparatively small.

High yields obtained in this process reduce the amount of charging stock required and, consequently, also the size of equipment necessary to produce a given amount of butadiene. Operating temperatures are relatively low so that requirement for materials and expensive alloy steels is kept to a minimum. Likewise, utilities, such as steam, fuel, power and water required, are low and less material is needed for plant and equipment to supply them.

The equipment of the dehydrogenation unit for production of butadiene is similar to that used in the existing Houdry catalytic plants. The reactors, or catalytic vessels, six in number, are of simpler design than in cracking plants.

The Process

The charging stock, butane, is subjected to dehydrogenating conditions in the reactors in two stages. The first stage yields butane, butylene and lighter gas. The butane and butylene portion is concentrated in a

vapor recovery system to produce the charge for the second dehydrogenating stage in which the butadiene production is effected.

The heat required for the chemical change of butane to butylene and from butylene to butadiene is furnished by burning the carbon deposit on the catalyst during the dehydrogenating stages. The regeneration of the catalyst is accomplished by burning the carbon deposit by passing air through the catalyst. The reactors possess sufficient heat storage capacity to eliminate wide temperature fluctuations, and pressure and rate of flow are regulated so as to balance the heat required for the chemical reactions with the heat supplied by the burning of the carbon deposit.

The Houdry process, so far as we know, is the only process which developed the technique of utilizing the adiabatic cycle of heat produced during the burning cycle of the carbon as the principal source of heat required for the dehydrogenation cycle. The separation and purification of butadiene may be effected by one of the available purification processes.

Yield of Butadiene

The high yield of butadiene obtained in the Houdry process as shown in the following table is the result of its unique operating cycle.

OVERALL MATERIAL BALANCE FOR 15,000 TON PER YEAR HOUDRY BUTADIENE PLANT

Fuel gas	23.6%
Catalyst deposit	9.5%*
Butadiene	66.9%
	100%

* Burned in the process.
Note: This material balance allows for losses in butane absorber and is based on 90% recovery of the butadiene in the purification process.

Full details of the process cannot be given since secrecy orders issued by the Government preclude their disclosure, except when permits are obtained by persons or companies interested in the erection of plants to utilize the process.

TABLE 4—ESTIMATED PRODUCTION COST FOR A HOUDRY COMBINED TWO-STAGE BUTADIENE PLANT TO PRODUCE 15,000 TONS PER YEAR, INCLUDING PURIFICATION PLANT

	Base Price	Quantity per Day	$ Calendar Day
1. Electric Power	$0.007/kwh	33,600 kwh	$ 235
2. Fuel oil burned (6,000,000 btu-per bbl.)	1.10 bbl. del. in Texas or Oklahoma	309 bbls.	340
3. Steam (from fuel or gas)	.33/M lbs.	2,040 M lbs.	673
4. Cooling Water	.008/M gal.	10,000 g.p.m.	115
5. Makeup Water	.15/M gal.	300 g.p.m.	65
6. Operating Labor:			
Process Plant, 10 men at $1.20 per hour	.....	.....	288
Laboratory, 5 men at $1.20 per hour	.....	.....	144
Undistributed Labor and Supervision	.....	.....	100
7. Catalyst	.....	.....	165
8. Solvent	.....	.....	216
9. Inhibitor	.....	.....	10
10. Maintenance (exclusive of boilerhouse and water system) — 6% of $3,036,420	.....	.....	500
11. Taxes, Insurance — 1% of $3,036,420	.....	.....	83
12. TOTAL OPERATING COST		.....	$2.934
13. Butane Charge	.06 gal. 2.52 bbl.	677 bbls.	1,706
14. Fuel Gas Credit	1.10 bbl.	158 bbls.	(Cr) 174
15. General Administrative Costs ($0.075/lb. Butadiene)	.....	.....	684
16. Royalty (@ $0.00125/lb. Butadiene)	.....	.....	115
17. TOTAL COST (exclusive of Amortization)	.....	.....	$5,265
18. COST OF BUTADIENE (exclusive of Amortization) — based on 66.9% yield from butane	.....	per lb.	$0.06421

Amendment No. 16 to Order M-15-b-1

Section 940.5 *(Supplementary Order M-15-b-1)* is amended as follows:

1. By changing paragraph (b) (3) thereof to read as follows:

(3) Rubberized fabrics for protective clothing (other than footwear and gloves) ..... List 3

2. By substituting the attached revised List 3 for List 3 now attached to such order.

Issued this 1st day of September, 1942.

AMORY HOUGHTON,
Director General for Operations

List 3 (Revised effective September 1, 1942)—*Specifications for the manufacture of rubberized fabrics for protective clothing (other than footwear and gloves).*

(1) Except as provided in paragraph (8) hereof, no person shall use any rubber, latex, reclaimed or scrap rubber in the manufacture of rubberized fabrics for protective clothing, except footwear, gloves and industrial occupational protective clothing consisting of pants, coats, jackets, hats, aprons, firemen's and policemen's clothing, parkas, ponchos, and rain suits.

(2) Except as provided in paragraph (8) hereof, the specifications set forth in this revised List 3 shall apply to all purchase orders including war orders and orders placed by any department or agency of the United States Government.

(3) No crude rubber or latex shall be used in compounds for rubberizing the fabrics for these products.

(4) Single coated fabrics shall contain not more than 12 ounces of compounds per square yard.

(5) Double coated fabrics shall contain not more than 19 ounces of compounds per square yard.

(6) Double texture fabrics shall contain not more than 10 ounces of compounds per square yard.

(7) Crude rubber may be used in the manufacture of cements and/or tapes necessary for seaming in the manufacture of these products.

(8) The restrictions and specifications imposed by this revised List 3 shall not apply to:

(i) Rubber life saving suits designed for use by seamen.

(ii) Aviation waders, self-inflating life preservers, dual tube belts and ponchos when required to fill war orders.

(iii) Commercial diving equipment.

(iv) Raincoats and parkas scheduled for delivery to or for the account of the United States Navy at any time prior to October 1, 1942, under the delivery schedules of purchase orders in existence on August 1, 1942.

Abstracts of United States Patents on the Compounding and Use of Synthetic Rubber

By FREDERICK MARCHIONNA, M. S. Chem.

Part IV

Buffington—U. S. Pat. 2,069,212—February 2, 1937. *Oil Cup Packing.*

An oil cup for use in hydraulic pumps or a cupped plunger type packing ring comprises a body portion, made of Thiokol or polychloroprene plastic, which has a central opening, an outwardly extending lip at the upper part thereof, and an inwardly extending base portion at the lower end. This body is provided with a reinforcing metallic element which is set within the ring. This element has an upper flanged portion having downwardly extending projection adjacent to the lip portion of the ring to reinforce the lip and prevent flopping of the cup member, and an inwardly projecting flange for reinforcing the base of the ring. The oil cup packing is attached to an ordinary plunger or piston by means of a follower ring.

Winkelmann—U. S. Pat. 2,075,253—March 30, 1937. *Thermoplastic Rubber Hydrochloride.* (Assigned to Marbon Corp., Gary, Indiana).

A thermoplastic product is obtained by combining a rubber hydrochloride with a polychloroprene. The rubber hydrochloride is preferably obtained by treating scrap inner tubes with liquefied anhydrous hydrogen chloride gas at —85° C. for about one hour so as to obtain an amorphous rubber hydrochloride containing about 23% chlorine, which is practically insoluble in benzene, carbon tetrachloride, etc. The rubber hydrochloride is stabilized by milling with calcium, magnesium oxide, etc., and plasticizers such as amyl benzene, butyl stearate, etc., may be added. A mass having great tensile strength and oil resistance is obtained by mixing equal parts of polychloroprene and the stabilized rubber hydrochloride. When this mixture is molded or calendered into sheet and cured it will show the properties of neoprene products.

Kirby—U. S. Pat. 2,076,949—April 13, 1937. *Dipped Polychloroprene Articles.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

Alkaline or acid polychloroprene latex are used for the production of dipped articles similarly to analogous articles made from natural latex. While these polychloroprene latices may be coagulated by heat, it is preferable to use chemical coagulants which may be applied to the forming mold and/or to the latex deposit. In one example, a suitable form is first dipped in an alkaline polychloroprene latex to form a film of the desired thickness which is coagulated by dipping in an acid latex. The mold formed may be the same type used in natural latex dipping methods. When only one kind of latex is used in the dipping process, the following coagulants are preferably applied to the form and/or to the latex deposit: 10% of ordinary concentrated hydrogen chloride in alcohol and an aqueous saturated solution of sodium chloride.

Collins et al—U. S. Pat. 2,077,399—April 10, 1937. *Moisture-Proof Sheets.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

A transparent, flexible, moisture-proof sheet consists of a non-fibrous cellulosic base film coated with a moisture-proof composition containing a polychloroprene and wax. The base film should preferably be made of cellophane or cellulose esters and ethers. Various coating compositions are given. In several examples the coating composition comprises polychloroprene and waxes, such as paraffine carnauba, etc., or mixtures thereof, in equal quantities. The wax, however, may vary from 100 to 1000% of the quantity of the polychloroprene. In one of the examples, there is used polychloroprene (5), paraffine wax (100 to 150), and gum dammar (10). In another, the coating composition comprises equal quantities of polychloroprene, wax and a polyvinyl chloroacetate copolymer. In two others, polychloroprene (7 and 9) is admixed with pyroxylin (10 and 72), paraffine wax (60 and 9), and carnauba wax (13) or tricresyl phosphate (10).

Collins—U. S. Pat. 2,078,194—April 20, 1937. *Drying Oil Products.* (Assigned to E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware).

A coating composition suitable for impregnating fibre products, the coating of tanks which come into contact with oils and grease, electrical insulation, etc., is obtained by preparing a drying oil from divinyl acetylene, butadiene, isoprene, dimethyl butadiene, etc. It is preferable to use divinyl acetylene since this material can be combined with 5 to 15% or even more of chloroprene before subjecting it to polymerization. Thus, the drying oil is obtained by heating the divinyl acetylene, with or without chloroprene, with an ester of a drying oil with a polyhydric alcohol, or a drying oil modified alkyd resin, the heating being controlled to prevent decomposition of the product and the reaction stopped before an insoluble gel is formed. These drying oils are clear, light-colored liquids containing varying quantities of alkyd resin and the polyvinyl acetylene-chloroprene mixture. A brushing paint is obtained by mixing the drying oil product (94), amorphous silica (157), asbestine (53), and naphtha (30) and working the mixture in a ball mill for 24 hours after which it is thinned with naphtha to the required consistency. In another example, 82% naphtha solution of the synthetic drying oil (297) is ball milled with ferric oxide (4.6), China clay (192), carbon black (80), asbestine (240), talc (192), and naphtha (583) and after 24 hours grinding incorporating therein 435 parts of the synthetic oil and toluene (236) and cobalt drier (41).

Thomas—U. S. Pat. 2,078,353—April 27, 1937. *Molded Products.* (Assigned to Monsanto Chemical Co., St. Louis, Mo.).

A resin having a clear amber color and which is soluble in naphtha is obtained by polymerizing a mono-olefine (ethylene,

propylene, etc.) with a diolefine (isoprene, etc.) in the presence of aluminum chloride as catalyst. Such a polymeric product is unsaponifiable and has an iodine number of 175 to 200. This resin, when admixed with sulfur and vulcanized, forms an amorphous binder for fibre or other types of filler. The fibre may be wood flour, paper pulp, shredded paper, asbestos, etc. A plasticizer for such a resin is dibutyl or diamyl phthalate, chlorinated diphenyl, China wood oil, castor oil, etc. The following examples of molding materials are given:

A. Copolymeric resin (20), sulfur (4.5), paper pulp (46), and wood flour (29.5).

B. Resin polymer (24), sulfur (4), wood flour (48), tire fibre (9.6), linseed oil (4.8), and a chlorinated diphenyl (9.6).

C. Resin (25), sulfur (3), tire fibre (22), shredded paper (45), and dibutyl phthalate (5).

D. Wood flour (45.4), tire fibre (18.2), China wood oil (9.1), castor oil (9.1), and hard resin (18.2).

E. Wood flour (61.8), hard resin (23.4), and shredded paper (4.8).

To form the molding material, the copolymer is placed in a mixer and heated to about 150° C. and 2 to 10% sulfur added. Before the temperature reaches 170° C. the wood flour, etc., is added. The quantity of resin may be from 5 to 50%; the sulfur 2 to 20%, and the balance the fibre filler. The mixture should be well agitated, being careful to keep the mass below 170° C., since at this temperature the sulfur reacts with the resin. The mixture is placed in a mold and consolidated and cured at 170° to 185° C. under a pressure of 7,700 lbs./sq. in. Radio cabinets, insulating panels, steering wheels, handles, etc., can be produced in this manner. A finish of pyralin or other plastic can be molded over the molded mass and heated so as to cause a reaction between the pyralin and the polymer, binding them firmly.

Lobdell—U. S. Pat. 2,079,943—May 11, 1937. *Electrical Insulation.* (Assigned to General Cable Corp., New York, N. Y.).

A metal conductor is insulated with a relative thick layer of vulcanizable natural rubber, which is coated with a thin layer from a non-porous, plastic material obtained by reacting ethylene dichloride or similar halides with an alkali metal polysulfide to produce a plastic polyethylene-polysulfide, which is heat-treated in the presence of ortho toluidine, beta naphthylamine, beta naphthol, etc., to inhibit or retard gas formation during cure. In one example, the conductor is insulated with a layer from a composition containing polyethylene polysulfide (500), natural rubber (75), zinc oxide (50), D.P.G. (4), ortho toluidine (5), sulfur (5), and talc (140), and heat cured for 50 minutes at 287° F. In another example, the conductor is first insulated with a layer of natural rubber, coated with an oil-resistant layer from a composition of polyethylene polysulfide (500), natural rubber (50), D.P.G. (4.5), ortho toluidine (5), zinc oxide (50), talc (100), stearic acid (5), carbon black (50), sulfur (5), and beta naphthylamine (5), and cured as above.

Lobdell—U. S. Pat. 2,079,944—May 11, 1937. *Electrical Insulation.* (Assigned to General Cable Corp., New York, N. Y.).

The disclosure of this patent is similar to that of U. S. Patent 2,079,943, but claims a method of producing a non-porous cured material from an olefine polysulfide by heating the prepared polyalkylene polysulfide in the presence of a small amount of an aromatic compound from the group consisting of ortho toluidine, beta-naphthylamine and beta naphthol which inhibit or retard the formation of free gas during th cure of the polyalkylene polysulfide. The heating may be effected before or during the cure. Preferably, the aromatic stabilizer is admixed with the compounded polysulfide and the mixture then cured to obtain a non-porous mass. The examples and mixtures given are the same as in the previous patent.

Stocklin and Konrad—U. S. Pat. 2,080,363—May 11, 1937. *Polybutadiene Copolymer Mixtures.* (Assigned to I. G. Farbenindustrie, A.G., Germany).

A plastic elastic composition comprises a copolymer of unsaturated hydrocarbons from the group consisting of butadiene and isoprene with an acrylo or methacrylo nitrile together with a high molecular weight polysulfide product. In one example, a copolymer of 75% butadiene and 25% acrylic acid nitrile (100) is admixed with a polyethylene polysulfide (100), lamp black (50), zinc oxide (20), and mercaptobenzothiazole (1), and the mass cured with a pressure of 3 atmospheres for about 50 minutes, thereby obtaining a plastic-elastic product which swells only slightly in benzene. In another example, the same copolymer of butadiene and acrylic acid nitrile (130) is compounded with a soft, plastic polyethylene polysulfide (70), red iron oxide (50), zinc oxide (20), sulfur (2), stearic acid (1), and accelerator (1), and vulcanized as above.

Winkelmann—U. S. Pat. 2,087,078—July 13, 1937. *Insoluble Products.* (Assigned to Marbon Corp., Gary, Indiana).

A cheap polychloroprene substitute is obtained by mixing crude rubber with polychloroprene and subjecting the mixture, preferably in the form of thin sheet or powder, to the action of anhydrous liquefied hydrogen chloride in the presence of about 5% of $AlCl_3$ $SnCl_4$, Sb_2Cl_5, or $TiCl_4$ for about 5 minutes or more to obtain an oil-resistant product which contains a small quantity of polychloroprene hydrochloride and natural rubber hydrochloride of 27% chlorine. Such a product may be heated and milled with basic stabilizers. A rubber hydrochloride produced similarly may be mixed with an equal quantity of polychloroprene and 100 parts of the mixture compounded with magnesium oxide (10), lead oxide (10), rosin (10), and aluminum oxide (1), and molded at 220° F. for 3 minutes.

Wedger—U. S. Pat. 2,087,878—July 20, 1937. *Bonding Sole to Shoe Bottom.* (Assigned to Boston Blacking & Chemical Co., Boston, Mass.).

A leather sole and the shoe bottom of a shoe are both coated with a polychloroprene cement, the solvent evaporated, and the coated surface of the sole contacted with water as in sole-tempering operations. The coated sole is subjected to the action of a swelling agent for the polychloroprene and pressed over the cemented shoe bottom while the cement is still tacky, thereby effecting a strong bond of the sole to the shoe bottom. A cement may consist of polychloroprene (907), magnesium oxide (91), zinc oxide (46), sulfur (27), monoethanolamine (30), diethylamine (23), benzene (1656 cc.), and trichloroethylene (1656 cc.), this composition forming one gallon of cement.

West—U. S. Pat. 2,087,942—July 27, 1937. *Gasket Products.* (Assigned to Crown Cork & Seal Co., Baltimore, Md.).

A cork composition suitable for gaskets which are to come into contact with oils, water, etc., and to be subjected to high temperature in service comprises cork and a polychloroprene binder. A typical formula comprises polychloroprene (200), stearic acid (2), and zinc oxide (15) as the toughening agent, these ingredients being mixed in a mixer and sulfur (2) with an accelerator (1.5) incorporated. Powdered cork, asbestos fibre, or disintegrated paper, or mixtures thereof (810) is then worked in and the mass sheeted, molded or calendered into a cloth backing, formed into a roll, and cured. Bodied tung oil and/or synthetic resin may also be added. Gaskets made from this material are particularly suitable for steam pipes, internal combustion engines, etc.

Dales et al—U. S. Pat. 2,088,407—July 27, 1937. *Mixed Latices.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

A latex dispersion of high stability and usefulness is prepared by combining a suitable quantity of natural latex with a polychloroprene latex and stabilizing the mixture with a

higher alkyl ester salt, such as the soluble salts of sulfuric, phosphoric and boric acid esters of a normal straight chain primary aliphatic alcohol containing from 8 to 18 carbon atoms. Several examples are given of mixed latices in which the relative quantities of natural latex and polychloroprene latex may be in the ratio of 0.5 to 0.1 and the concentration of the two latices may vary between 30 and 45%. The quantity of the stabilizer, which may be sodium isopropyl naphthalene sulfonate, sodium lauryl naphthalene sulfonate, etc., may be 0.5% of the polychloroprene latex and about 5% of the natural rubber. In an example, 277 cc. of 33% aqueous emulsion of a polychloroprene, 2 cc. of ammonia, and 0.5 gr. of an alkali salt of an alkylated naphthalene sulfonate are admixed with 25 cc. of 37% latex previously stabilized with the alkylated naphthalene sulfonate salt. Vulcanized natural latex can be used instead of normal latex.

Friedlander—U. S. Pat. 2,088,472—July 27, 1937. *Treating Printing Rolls.* (Assigned to Dayton Rubber Mfg. Co., Dayton, Ohio).

The surface of printing rolls having an ink-resistant layer of polychloroprene is treated with glycerine, China wood oil, oitica oil, etc., so as to impart to the roll surface an initial tackiness and also to increase its resistance to oils. In the treatment of the roll, the printing surface of the roll having a Duprene (neoprene) surface layer is contacted with another roll or rolls so arranged that a pool of the treating oil is formed between these rolls and the printing roll. The contacting rolls are so positioned that they cause stretching of the neoprene layer while the oil is being applied, thereby causing absorption of the oil in the neoprene layer while the printing roll is being rotated.

Williams—U. S. Pat. 2,093,501—September 21, 1937. *Electrical Insulation.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

An electrical conductor is insulated with a polychloroprene or a polychloroprene-natural rubber mixture, or first with a ground layer of natural rubber and then with the polychloroprene rubber. Thus, a conductor wire is insulated with an extruded insulating layer from a mixture of polychloroprene (10), zinc oxide (7), and clay (14), with softener and antioxidant added, and the wire heated at 135° C. to cure the insulation. In another example, a wire conductor is first coated with a vulcanizable rubber insulation containing crude and reclaimed rubber, fillers and vulcanizing agents, and this layer covered with an extruded layer from a composition of polychloroprene (30), zinc oxide (3), magnesium oxide (3), rosin (1.5), wax (0.5), antioxidant (0.3), brown factice (3), and carbon black (10), and the composite insulation cured. In still another example, the conductor wire is coated with a single extruded layer from a composition consisting of a polychloroprene (50), natural rubber (50), zinc oxide (10), litharge (20), rosin (1.5), phenyl-beta-naphthylamine (1), sulfur (1.5), carbon black (35), softener (4), and accelerator (0.5), and cured as above.

Friedlander—U. S. Pat. 2,094,008—September 27, 1937. *Printing Rolls.* (Assigned to Dayton Rubber Mfg. Co., Dayton, Ohio).

A printing roll comprises a steel axle which is sandblasted, coated with a hard rubber cement, and covered with successive thin layers of hard rubber and soft rubber. This composite structure is cured in hot water at 250° to 260° F. for three to six hours at a pressure of 150 to 200 pounds. The vulcanized rubber surface is roughened with a wire brush and given two coatings from a Duprene (neoprene) cement containing polychloroprene, zinc and magnesium oxides, sulfur, cumar resin, and cottonseed oil dissolved in benzol. A soft rubber sheet is wound over the cement coating and strips of neoprene collars are simultaneously wrapped at each of the ends of the roll and the structure cured in hot water. The diameter of this roll is then ground to 1.86 inch and a layer of neoprene cement applied. A sleeve or neoprene is formed on a mandrel, turned inside out, and fitted over the cement-coated surface to cover the entire roll surface. The roll is then given a final cure at 270° F. for one hour at 50 pounds air pressure, trimmed and finished as desired.

Healy—U. S. Pat. 2,097,212—October 26, 1937. *Tabbing Cement.* (Assigned to Lee Hardware Co., Salina, Kansas).

A cement suitable for cementing the loose sheets of a pad or for book bindings may consist of a natural latex or a polychloroprene latex. A cement of the latter type consists of the three following constituents: (a) Polychloroprene [500] in the form of latex; (b) Casein [60] dissolved in water [300] containing concentrated ammonia [5]; and (c) A sulfated higher alcohol [1] in water [150] to which there is admixed zinc oxide [28] and cellulose flock or cotton linters [25]. Solution (c) is ball milled and added to the mixture of (a) and (b). Instead of an aqueous dispersion of the polychloroprene latex there may be used a solution of the polycholoroprene. Thus a cement may consist of polychloroprene (1 lb.) dissolved in benzol (1 gal.). The cement may be used as such, but preferably should be admixed with cellulose flock (1 oz.) magnesium oxide (3 lbs.), and zinc oxide (10 lbs.). Instead of polychloroprene rubber a polybutadiene rubber may be used which can be admixed with a quantity of natural latex.

Stewart—U. S. Pat. 2,099,241—November 16, 1937. *Packing Material.* (Assigned to Garlock Packing Co., Palmyra, N. Y.).

A packing particularly suitable for stuffing boxes and other joints in apparatus in which gaseous and liquid hydrocarbons under pressure are used comprises an oil-resistant binder of polychloroprene, asbestos, graphite, aluminum powder, and lubricating oils. The following formulas are given:

I. Alpha polychloroprene (1.96), asbestos powder (21.56), "Bearium" bronze alloy powder (47.06), and graphite (29.42).

II. Polychloroprene (4.3), lubricating oil (3), asbestos (30), aluminum powder (18), and graphite (44.7).

III. Polychloroprene (7.33), lubricating oil (4.89), asbestos (29.26), aluminum powder (14.64), and graphite (43.88).

IV. Polychloroprene (9.09), lubricating oil (9.09), asbestos (27.27), aluminum powder (13.63), and graphite (40.92).

V. Polychloroprene (12.5), lubricating oil (10), asbestos (25), aluminum powder (15), and graphite (37.5).

The polychloroprene in the above formulas is one compounded with 20% magnesium oxide, 20% zinc oxide, 10% rosin, and 4% phenyl-alpha-naphthylamine.

Stewart—U. S. Pat. 2,099,242—November 16, 1937. *Packing Material.* (Assigned to Garlock Packing Co., Palmyra, N. Y.).

This patent has practically the same disclosure as U. S. Pat. 2,099,241 above, claiming, however, a packing material containing a vulcanizable binder, as follows: natural rubber or polychloroprene (7 to 12.5), lubricating oil (5 to 10), asbestos fibre (25 to 37), aluminum powder (14.5 to 18.5), and graphite (28 to 44).

Wiezevich—U. S. Pat. 2,104,409—January 4, 1938. *Lubricating Products.* (Assigned to Standard Oil Development Co., New York, N. Y.).

A lubricating material of improved quality can be obtained by incorporating in a mineral oil from 0.2 to 10% of an alkylated or hydrogenated polychloroprene. While the polychloroprene may be added as such to the oil lubricant, it is preferred to condense it with naphthalene, benzene, etc., in the presence of a catalyst such as boron fluoride, aluminum chloride, acetic or sulfuric acids, etc. Hydrogenated polychloroprene obtained by hydrogenation cracking may be used. The alkylated polychloroprene may be obtained by reacting the polychloroprene with an alkyl halide. Any of these polychloroprene products are in form of viscous materials which dissolve in the lubricating oils to increase their viscosity index. These polychloroprenes may also be used to thicken other oils, chlorinated diphenyl, etc. To the lubricating oils containing the polychloroprene compound there may be added phthalates, glycerides, butyl oleate, poly-diphenyl oxide, etc., to further enhance the quality of the lubricant.

McDonald—U. S. Pat. 2,105,697—January 18, 1938. *Polychloroprene Cements.* (Assigned to Boston Blacking & Chemical Co., Boston, Mass.).

Good adhesive cements particularly suitable for the shoe industry are obtained by dissolving a polychloroprene in a cyclic ether of glycol, including ethylene oxide, alpha propylene oxide, isobutylene oxide, tetrahydrofurfurane, tetramethylene oxide, gamma-pentylene oxide, delta-hexylene oxide, ethylene methyl ether, dioxan, furfurane, 1-methyl hydroturfurane, etc. The following formulas are given: [a] Polychloroprene (1) in propylene oxide (6); [b] Polychloroprene (1) in furfurane (7); [c] Polychloroprene (4) in dioxan (10), ethyl ether (7), and methyl acetate (9).

McDonald—U. S. Pat. 2,105,746—January 18, 1938. *Playing Ball.* (Assigned to B. B. Chemical Co., Boston, Mass.).

In a method of securing a balata cover to the core of a golf ball, the core is wrapped with a rubber thread in the conventional manner, and this wrapping is coated with a polychloroprene cement in a solvent which will not attack the rubber thread wrapping to any great extent, such a solvent being selected from the group consisting of propylene oxide, dioxan, and furfurane. On evaporation and removal of the solvent, a balata cover, in the form of hemispherical molded shells, is molded over the tacky cement and the ball cured at 212° to 260° F. to effect a strong and permanent bond of the cover to the core. In the specific example, the golf ball center having the rubber thread wrapping is dipped in a cement consisting of polychloroprene (1) in propylene oxide (6) to form a uniform cement layer which is heated to evaporate the solvent. The hemi-spherical shells of balata are applied over the cemented core to cover it completely, and the ball placed in a mold and heated at 230° to 240° F. for about 2 minutes to firmly bond the cover to the core. About 5% of rosin with 5% of zinc oxide, and 10% of magnesium oxide, may be added to the above cement.

McDonald—U. S. Pat. 2,107,796—February 8, 1938. *Deodorized Polychloroprene.* (Assigned to B. B. Chemical Co., Boston, Mass.).

The disagreeable odor of polychloroprene is eliminated by milling the material in the presence of an aliphatic alcohol, such as methyl, ethyl, propyl, and butyl alcohol. The process is carried with fresh alcohol until the disagreeable odor has disappeared. Thus, the polychloroprene is milled and caused to pass through a bath of the alcohol, milled again, passed through the alcohol, etc. Or a stream of ethyl alcohol may be directed against the surface of the polychloroprene while being milled. Or the milling rolls may be dipped in the alcohol, and the polychloroprene passed between these alcohol-wetted rolls.

Collins—U. S. Pat. 2,109,968—March 1, 1938. *Polychloroprene Electrodeposition.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

Strong and tear-resistant products resembling natural rubber vulcanizates are produced by forming a polychloroprene latex, with or without a quantity of natural latex, and this latex deposited anodically on a supporting base constituting the anode by the passage of a suitable current through the latex. This process of electrodeposition is the same as those used for natural latex as described in several patents. (See Marchionna's *Latex and Its Industrial Applications*, Vol. I, 1932, published by THE RUBBER AGE, New York). The latex from the polychloroprene may be concentrated and may contain a stabilizer, such as phenyl-beta-naphthylamine. Such a latex is treated with 2.5 grams of ammonium chloride dissolved in six volumes of water, using an equal volume of polychloroprene latex. The latter should contain preferably a quantity of an alkali salt of an alkyd resin. The treated latex is placed in an electrolytic cell containing a small zinc plate as the cathode and a large zinc plate as the anode, and a current of about 1 ma/sq. cm. passed through the bath for a time sufficient to effect the deposition of a polychloroprene layer which is dried, stripped from the anode, and cured.

Rice—U. S. Pat. 2,112,544—March 29, 1938. *Printer's Blanket.* (Assigned to U. S. Rubber Co., New York, N. Y.).

A printer's blanket is produced by coating a fibre base with a primer coating of natural latex and a surface coating from a polychloroprene, polybutadiene, Thiokol, or Shinkle's synthetic plastic as described in U. S. Pat. 1,967,292. A mixture of polychloroprene and Shinkle's synthetic plastic, however, is used as the surface coating layer. The base fibre sheet may consist of a three-ply composite fabric joined with a rubber cement. This base is coated with a ground layer of a compounded natural latex to form a layer about 0.005 to 0.007-inch thick, which is dried at 90° C. The layer is then treated with a rubber cement in a volatile solvent to enhance the adhesion of the polychloroprene composition thereto. The polychloroprene layer is applied in the form of a 30% solution in naphtha, benzene, ethylene dichloride, etc., and may consist of polychloroprene (100), Shinkle's plastic (15), carbon black (50), whiting (50), magnesium oxide (10), zinc oxide (10), rosin (5), cottonseed oil (5), and sulfur (0.5). After a layer of the desired thickness has been formed the sheet is dried at 90° C. and then cured at 270° C. under a steam pressure of 60 pounds for 40 minutes, thereby obtaining a flexible and an oil and ink-resistant printer's blanket which is durable and has good aging properties.

Friedlander—U. S. Pat. 2,113,724—April 12, 1938. *Veneer Roll.* (Assigned to Dayton Rubber Mfg. Co., Dayton).

A printing roll consists of the conventional axle surrounded by a layer of vulcanized rubber, and a coating of polychloroprene containing from 92 to 80% of an alkyd resin from the reaction of glycerine and adipic acid. To make this roll the axle is coated with a rubber cement and a thin soft rubber sheet wound thereon and vulcanized under water. The rubber surface is roughened with a wire brush and a chloroprene rubber cement applied over the rubber; the polychloroprene-glyptal resin, in the form of sheet, is then cemented on, and after winding adhesive tapes to form abutting shoulders on both ends of the roll, the article is vulcanized and finished.

Alexander—U. S. Pat. 2,117,591—May 17, 1938. *Vulcanized Products.* (Assigned to the B. F. Goodrich Co., Akron).

Polychloroprene, polyvinyl chloride or acetate, chlorinated rubber, etc., can be vulcanized in the presence of an aliphatic aldehyde-aromatic amine condensate as curing agent. The action of this agent being rather rapid, it is suggested that an alkali or an alkali earth silicate or oxide should be added as stabilizer. In three polychloroprene sheets prepared from (a) polychloroprene alone; (b) polychloroprene (98) and magnesium oxide (2); and (c) polychloroprene (96), magnesium oxide (2), 1-phenylamine-2.4-diethyl octadiene (2), it was found that while (a) and (b) were soft, sticky masses after curing for 15 minutes at 260° F., the sample from (c) was solid and elastic, having a tensile strength of 2036 lbs./sq. in., and an elongation of 1005%. A butyraldehyde-para phenylene diamine condensate, etc., may be used as the curing agent.

Siegel—U. S. Pat. 2,117,860—May 17, 1938. *Colored Synthetic Rubber.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

Natural or synthetic rubbers are colored by incorporating therewith a small quantity of a dye obtained by coupling diazotized 2-chloro-4-amino-1-toluene-5-sulfonic acid with 2-naphthol-3-carboxylic acid. In one example, a polychloroprene (100) is compounded with magnesium oxide (10), rosin (5), zinc oxide (10), lithopone (50), titanium oxide (10), sulfur (1), and the calcium lake of 2-chloro-1-methyl-5-sulfonic acid-4-azo-2-hydroxy naphthalene-3-carboxylic acid (2). The mass is sheeted and cured for 20 minutes at a steam pressure of 60 pounds to obtain a bluish red product. In another example, a synthetic butadiene rubber (100), lithopone (30), stearic acid (2), zinc oxide (50), sulfur (2.5), accelerator (1), and the calcium lake of 2-chloro-4-amino toluene-5-sulfonic acid combined with 2-naphthol-3-carboxylic acid, extended with aluminum hydrate (2), is sheeted and cured as above into a bluish-red vulcanizate.

(To Be Continued)

Editorials . . . . . .

The Rubber Director

JUST as the last issue of this journal went to press, William M. Jeffers, president of the Union Pacific Railroad, was appointed Rubber Director by Donald Nelson, chairman of the War Production Board. The action was taken as a result of the recommendation of the Baruch Rubber Committee. The committee, incidentally, recommended that the director named be a "manufacturing executive, preferably with experience in the rubber industry," but it also stated that "he should be a man of unusual capacity and power." Mr. Jeffers is not a manufacturing executive and admittedly has no knowledge of rubber, but based on his actions in the past few weeks he seems to measure up to the rest of the qualifications indicated by Mr. Baruch and his associates on the committee.

Mr. Jeffers, in our opinion, has moved wisely in two most important respects. First, he appointed Col. Bradley Dewey, of the Dewey & Almy Chemical Co., well versed in rubber and synthetic rubber technology and respected in the industry, as his deputy director, and second, he has just named a technical staff to cooperate with Col. Dewey in the operation of the tremendous and complex synthetic rubber program. Mr. Jeffers can order national gas rationing to conserve rubber, as he has done, and issue directives to keep all essential cars on the road, as he will do from time to time, but it still takes technologists to build, supervise and operate synthetic rubber plants. It will be recalled that E. R. Weidlein, of Carnegie Institute, who first headed the Chemicals Branch of WPB and who more recently has acted as technical consultant on synthetic rubber to the Rubber Reserve Co., has practically pleaded from the beginning for the creation of such a group.

Rubber Director Jeffers has a reputation for being "hard." How "hard" and "tough" he can be was demonstrated earlier this month in his first appearance before a Congressional committee since his appointment. He was apparently called on the carpet for his decision to substitute rayon for cotton, as a base for heavy duty and combat tires purchased by the Army. Some of the committee's members felt that in view of the fact certain tests on rayon-base tires had not yet been completed by the Army the program should be held up. Mr. Jeffers bluntly told the committee that he was first concerned with winning the war in the quickest way possible, and if the Army wants rayon-base tires they would get them despite Congressional committees and pressure groups. The Rubber Director was not entirely dictatorial by any means. He had in his possession enough facts to indicate that tests completed to date favor the use of rayon over cotton as a base for heavy duty and combat tires.

In his own words, Mr. Jeffers has adopted the report of the Baruch Committee as his "textbook" and intends to "bull" the rubber program through in the shortest possible time. In this endeavor he will have the whole-hearted support of the entire rubber industry. He will also have the active support of Arthur B. Newhall, who at this writing is still associated with the rubber program. Mr. Newhall, as Rubber Coordinator, laid the groundwork for a solid program, one that will succeed if vigorously pushed. Even while he was waiting for the appointment of a Rubber Director, the Rubber Coordinator was not inactive. He spent days working on an executive order which would give the new "boss" of the rubber program power that he himself never secured. When the synthetic rubber plants are completed and are turning out close to a million tons of synthetic rubber, considerable credit will be due to the former Goodrich executive.

Necessary Driving

ONE of the early actions of Rubber Director Jeffers was the issuance of an appeal to all motorists to drive only when necessary, keep under 35 miles an hour, keep tires properly inflated, have them inspected regularly, and share their cars with others. Each one of these steps will help to conserve rubber, and some of them will be mandatory in the early future, but more "teeth" should be put into "necessary driving." There are still thousands of motorists in urban areas who use their cars to drive a half-dozen blocks to the movies, or to a bridge game, or to a party, or to some other form of entertainment. While there is good reason for such car use in suburban areas there is absolutely no plausible excuse for it in urban territories where trolley cars, buses and taxis are still in abundance. The feeling still exists that "if the other fellow can do it, so can I." Driving regulations need further tightening. There is a war to be won.

CURRENT NEWS OF THE MONTH

RUBBER DIRECTOR JEFFERS TAKES CONTROL; NAMES COL. BRADLEY DEWEY AS HIS DEPUTY

THE appointment of William M. Jeffers, president of the Union Pacific Railroad, as Rubber Director was announced just as our last issue went to press. Since that time Mr. Jeffers has taken over the reins of the rubber program and has appointed Col. Bradley Dewey, president of the Dewey & Almy Chemical Co., of Cambridge, Mass., as Deputy Director. Biographies of both Mr. Jeffers and Col. Dewey appear on Page 61 of this issue. The new Rubber Director is vested with all the authority of the Chairman of the War Production Board over the rubber program in all its phases. In turn, he will issue directives to all governmental agencies concerned with rubber, and, in fact, has already issued several new directives.

The executive order providing for the coordination and control of the rubber program was signed by President Roosevelt on September 17. It included the following among its provisions:

1. The Chairman of the War Production Board is authorized and directed to assume full responsibility for and control over the Nation's rubber program in all of its phases, including, but not limited to: technical research and development, importation, purchase, sale, acquisition, storage, transportation, provision of facilities, conservation, production, manufacturing, processing, marketing, distribution, and use of natural and synthetic rubber, related materials, and products manufactured therefrom.

2. There shall be, within the War Production Board, a Rubber Director, appointed by and responsible to the Chairman of the War Production Board for the administration of the Nation's rubber program.

3. In carrying out this order, the Rubber Director may direct the Rubber Reserve Company and other subsidiaries of the Reconstruction Finance Corporation, the Office of the Petroleum Coordinator for War, the Board of Economic Warfare, the Office of Defense Transportation, the Office of Price Administration, the Department of Agriculture, and such other departments, establishments, and agencies as he may deem necessary, to execute such aspects of the rubber program in such manner and for such period of time as he deems advisable, and full compliance shall be accorded such directives by the Federal agencies concerned.

4. In accordance with the provisions of paragraph 3 and unless future directives issued thereunder shall otherwise provide:

A. The Office of the Petroleum Coordinator for War shall, upon and under the direction of the Rubber Director:

(1) Conduct or promote developmental research in the production and manufacture of butadiene from petroleum and natural gas products and recommend new production and manufacturing methods for the consideration of the Rubber Director.

(2) Serve as the agency of the Government in supervising, upon completion of construction, the operation of plants producing synthetic rubber raw materials made from petroleum and natural gas products.

B. The Rubber Reserve Company shall, upon and under the direction of the Rubber Director, serve as the agency of the Government in supervising the construction of all plants under the rubber program, including plants manufacturing butadiene from petroleum and natural gas products.

Will Heed Baruch Report

In accepting his appointment as Rubber Director, Mr. Jeffers said that he would do "whatever was necessary" to carry out his new assignment. He said that "I am mindful of the words used in the Baruch report in which it is said that the existing rubber situation is so dangerous that, unless we take conclusive steps, this country will face both a military and civilian collapse." A significant note was put into his acceptance with the words, "I cannot do any more talking about the matter now. We do not need talk—we need action."

It is quite evident from the Rubber Director's initial actions that he is first tackling the job of rubber conservation before he makes changes, if any, in the synthetic rubber portion of the program. On September 25 he ordered nationwide gasoline rationing on the same basis as the rationing program now existing in the 17 Eastern states. He also called for a speed limit of 35 miles an hour and asked for voluntary control by motorists until the program can be put under way. The rationing program, discussed in more detail later, will be carried out by OPA.

In a radio address on October 6, Mr. Jeffers stated that "This is a nation on wheels, and it must be kept on wheels." Any restrictions imposed on motorists, he said, should be regarded as a plan whereby we can keep automobiles operating, rather than to restrict their use. He added that the Baruch report was his "textbook" and stated that he will "bull" the rubber program through as suggested in that report. A few days earlier, he asked all American newspapers to carry a special message on rubber conservation for their readers as frequently as possible until nation-wide gasoline rationing was instituted.

Defies Pressure Group

An indication of the firmness with which Rubber Director Jeffers intends to handle the rubber program was demonstrated on October 12 when he appeared before the Senate Agriculture Committee at its request in connection with the report that rayon would be substituted for cotton as a base for heavy duty tires for the Army.

Mr. Jeffers bluntly told the committee, which fired questions at him with machine gun staccato, that if the Army wanted to substitute rayon for cotton for these tires the Army would get rayon regardless of the protests of any Congressional group or any one else. "We have been gambling with this war too damned long," he said, and added, "I don't intend to be influenced by anybody, any time or anywhere."

"I am not going to put myself in a position where it can be said that I haven't the intelligence or the guts to do a job," he said at another point. "The trouble with this whole situation is that it has been a muddle of men who were

LATE NEWS

Just as this issue went to press Rubber Director Jeffers announced the appointment of a staff of technical consultants to work with Deputy Director Dewey. Those appointed were E. B. Babcock, chief chemist, Firestone; L. D. Tompkins, vice-president, U. S. Rubber; E. R. Gilliland, professor of chemical engineering, M.I.T.; W. L. Campbell, vice-president, American Machine Defense Corp.; Morehead Patterson, president, American Machine Foundry Co.; and Ray P. Dinsmore, manager of development, Goodyear.

afraid that some Congressional committee or pressure group wouldn't like their decisions. I am going to make my decisions and I'll stand by them."

Mr. Jeffers agreed with Senator Stewart, of Tennessee, that the Army had not yet completed its tests of rayon as a tire fabric, but stated that nevertheless the tests have already proved that rayon-base tires for big Army trucks had higher tensile strength and a greater resistance to deterioration from heat.

In answer to a statement from Senator Bankhead, of Alabama, to the effect that under war production legislation the new rayon plants would be able to amortize their investments in a few years and then be completely free to compete with cotton, Mr. Jeffers replied that "as I see it, our job is to win the war and stop worrying about what may happen afterward." He added that cotton was not entirely out of the Army picture and that tests were now being made to determine if heavy cotton cord can do as well as rayon. He told the committee that he had been informed that Germany was using rayon as a tire fabric and also that such tires require less rubber than those made with a cotton base.

(EDITOR'S NOTE: The National Cotton Council appealed to Donald Nelson, WPB chairman, on September 27 to withhold the proposed expansion of the rayon tire cord program pending completion of the Army's tests. Oscar Johnson, of Memphis, Tenn., president of the council, charged that the expansion threatened "serious injury and injustice" to cotton's largest market, and said that in the face of preliminary evidence such a program was neither necessary nor justified by the war effort.)

Farm Bloc Is Optimistic

Members of the farm bloc in the House and Senate, particularly in the latter, who have been fighting for the establishment of a rubber-from-grains industry as part of the synthetic rubber program, have expressed confidence that the new Rubber Director will authorize the construction of plants in the grain belt. The Director has made no public statement in this regard.

On September 28, however, Senator Raymond E. Willis, of Indiana, a member of the Senate Agriculture Subcommittee which has been investigating the rubber situation and which, despite the appointment of Mr. Jeffers as Rubber Director, is continuing its investigations, introduced a resolution in the Senate providing for 30-day reports from Mr. Jeffers showing the progress of the entire synthetic rubber program. In introducing the resolution, Senator Willis stated that the appointment of a Rubber Director did not relieve Congress of its duty to assure the people that every source of rubber is being utilized.

Senator Guy Gillette, of Iowa, chairman of the subcommittee, told the Senate on the same day that he had talked with Mr. Jeffers and believes that the railroad executive is "sold" on the use of grains for the production of butadiene for the synthetic rubber program. He added that "members of the subcommittee are convinced that there will be no delay in working out a solution of the rubber problem satisfactory to the whole country." He intimated that any legislation would be held up until the new Rubber Director had been given every chance to make good.

Trade Approves Appointment

The rubber industry in general approved the selection of Mr. Jeffers as Rubber Director despite the fact that the Baruch report had suggested that the director named be one well versed in rubber technology and with a background in the rubber field. Mr. Jeffers' selection of Col. Bradley Dewey as his deputy was regarded as a wise move, since Col. Dewey is a recognized technologist in his own right and is conversant with synthetic rubber problems.

Based on the report of the Baruch Committee and the apparent decision of the Rubber Director to keep all essential cars on the road for the duration, the tire industry is preparing for the mass production of reclaimed rubber tires. Crude rubber, approximating four ounces per tire, will probably be used for cementing the plies. These tires will lend themselves to recapping.

Although no definite announcements have been made, it is understood that the plan proposed by Mr. Jeffers will call for the production of about 2,000,000 tires a month in 1943. Enough reclaim would be made available for civilian use to make more than 23,000,000 tires in the next sixteen months. Some of this rubber would probably be diverted to a recapping program. Tire manufacturers are confident they can supply all the civilian tires needed without interfering with their war contracts.

Resale of Reclaimed Rubber

A ceiling for Rubber Reserve Company resales of reclaimed rubber purchased by it under a WPB order permitting holders of idle or frozen stocks to dispose of them to that government agency was established on September 26 by OPA.

The ceiling on such sales by Rubber Reserve is the price it has to pay plus transportation charges from the place where the material is bought to the place where it is moved at Rubber Reserve's direction. The price Rubber Reserve has to pay is governed by M.P.R. No. 204 on idle or frozen materials sold under Priorities Regulation No. 13.

The resale figure was contained in Amendment 1 to Revised Price Schedule No. 56 on Reclaimed Rubber, the amendment becoming effective on September 26.

PRICE FORMULA FOR RUBBER PRODUCTS SET, OTHER REGULATIONS

Methods by which manufacturers can readily determine the maximum prices that they may charge for new lines of rubber products were established by OPA on September 15 by the issuance of Maximum Price Regulation 220 for Certain Rubber Commodities. The principal effect of the regulation, which will be reproduced in full in our next issue, is to replace Section 3 (b) of the General Maximum Price Regulation, which requires manufacturers to apply to OPA for a pricing method on new merchandise when other price-determining methods will not serve, by definite formulas whereby manufacturers themselves can price new goods, subject only to final review by OPA.

Although rubberized fabrics and protective clothing are the principal products covered by the new sweeping regulation, it also applies to most other rubber products that were not already covered by specific maximum price regulations. The maximum manufacturers' prices already prescribed for reclaimed rubber, tires and tubes, camelback, waterproof rubber footwear, mechanical rubber goods, and the military items covered by MPR No. 157, are not affected by the new regulation. Rubber drug sundries, airplane tires and tubes, and heels and soles are also excluded from it.

In pricing a new article, under the regulation, the manufacturer must apply the following standards:

1. If only minor changes are made from an article already being sold, the producer must use as the ceiling price for the new article the maximum price for the existing article. Minor changes are those which do not reduce the cost of products or prevent the new article from offering fairly equivalent serviceability. A change in the styling of a raincoat so as to remove the slit in the back is an example of a "minor change," provided that the cost of the material is not lowered.

2. If the new article results from substantial changes compelled by shortages of material or parts used in the original article, the manufacturer may charge no more than the maximum price for the original article, plus or minus any increase or decrease in the direct costs of production resulting from the change.

3. If the new article cannot be priced under (2) above, the manufacturer must use one of two pricing formulas, one for use in determining on a cost-estimate basis what the maximum price for the new item shall be, and the other for computing the ceiling level on subsequent sales of the same item.

Maximum prices for the first sale of new products not heretofore made by a manufacturer are determined by estimating the quantities of direct labor and materials required, computing their March, 1942, costs and adding the gross

margin calculated at the rates and methods used by the producer in March, 1942, for the most comparable article.

The cost of a component material is to be determined on the basis of the highest price charged the manufacturer by his supplier during March, 1942, or the maximum price established by the Office of Price Administration, whichever is the lower. Calculations of labor cost under the formula for pricing new products are to be made by multiplying the estimated number of hours of each type of labor required by the highest wage rates that the manufacturer paid during March, 1942, for the type of labor used.

A formula for use by the Tyer Rubber Co., Andover, Mass., in determining the maximum price for a politzer syringe made of neoprene instead of the natural rubber previously used was prescribed by OPA in an order issued on September 24. The formula provides that the maximum is to be determined by adding or subtracting the increase or decrease in direct labor and material costs resulting from the change from rubber to neoprene. Methods for use in computing both wage and material costs at the March, 1942, level were set forth in the order, with OPA reserving the right to review the maximum price established by the company under the formula.

The above sign around the special scrap bin erected in a yard at the Seiberling Rubber plant in Akron speaks for itself. Company employees keep improving their aim as they try to "ring the bell" on Hirohito's breast with all the scrap metal they can collect around their homes and at the plant.

Rubber Footwear

Rationing of men's rubber boots and rubber work shoes went into effect on October 5. The restriction, covered in Ration Order No. 6 announced by OPA on September 29, went into effect five days after all such stocks were ordered "frozen" in the hands of retailers and other distributors. The action was the first venture of the Government in the field of clothing rationing. A directive giving OPA the authority to ration rubber footwear was issued by WPB on October 4. The five-day "freezing" action was considered necessary to stave off a buyers' run on stocks then in stores and to give dealers time to take inventory.

Only six types of men's rubber boots and rubber work shoes, all of which require a high rubber content, are covered in the rationing order, these being: (1) Hip-height rubber boots, including all boots of hip, body and thigh heights; (2) Over-the-knee rubber boots, including Storm King height; (3) All heavy short rubber boots; (4) All lightweight short rubber boots; (5) Rubber pacs and bootees 10 inches or more in height; and (6) Rubber pacs, bootees and work shoes less than 10 inches in height. In order to secure any of these types of boots and work shoes consumers now have to get certificates from their Local War Price and Rationing Boards.

Special forms on which all sellers of the rationed boots and work shoes must file inventory reports as a condition to selling footwear of this kind have been made available. Employers who furnish the rationed items to their employees may also be required to file inventory reports, but employers who purchase this footwear and resell it to their employees must report on inventory.

It was pointed out by OPA that those eligible to obtain certificates for the rubber boots and work shoes now being rationed will be men employed on jobs essential to the war effort or to the protection of public health or safety. The applicant must establish the fact that the work he performs is essential and he must specify the type of rationed footwear he needs and the conditions making it necessary for him to have it. He must establish the fact that he has no wearable rubber footwear suitable for use on the job and also must agree to turn in for salvage any unserviceable rubber footwear he owns.

Members of the crews of ocean-going vessels, however, may purchase rubber boots or heavy rubber workshoes from their ship's slop-chest without getting a rationing certificate. Operators of such ships may buy supplies of rationed rubber footwear without presenting the replenishment portion of rationing certificates to suppliers. These provisions are contained in Amendment No. 1 to Ration Order No. 6, issued on October 6.

It was also stressed that ordinary rubbers, Arctics, gaiters and women's and children's rubber boots will not be rationed and are not covered by the present regulations because these types are largely made from reclaimed rubber.

William W. Stephenson, formerly associated with the U. S. Rubber Co. as manager in charge of the Buffalo and Syracuse districts in New York, has been appointed Chief of the Rubber Footwear Branch of the Miscellaneous Products Rationing Division of OPA. He has been associated with the rubber footwear business since 1923 when he began as stock man in a rubber footwear distribution warehouse in New York City.

Just prior to the announcement of the rationing regulation, OPA issued Maximum Price Regulation No. 229 (on September 28) covering maximum prices for the new Victory line of waterproof rubber footwear. This type of footwear, as previously recorded, is produced under WPB orders limiting the amount of crude rubber which may be used. The new regulation covers heavy occupational rubber footwear as well as ordinary civilian articles.

Retail price maximums are established in dollars and cents at five different levels for each item. The level applicable to a retailer depends upon the amount he paid his supplier, whether the supplier was a manufacturer or wholesaler. The price paid to the supplier, in turn, depends upon the discount that the supplier allowed the retailer from the maximum wholesale prices as established in the same regulation. Four of the ceiling levels are set in accordance with the discount plan and the fifth is a special provision for mail order houses.

The maximum prices established by the new regulation supersede those set by the General Maximum Price Regulation for Victory line waterproof rubber footwear, which includes all footwear manufactured since February 11 when the WPB order limiting the use of crude rubber went into effect. Be-

cause of the substitutions of materials necessary in its manufacture, the Victory footwear is virtually a new line. As there were negligible sales in March, the base price period used in the general price regulation, it was difficult for wholesalers and retailers to determine maximum prices, which led to the issuance of the special regulation.

Elastic Webbing

To clarify a confusing situation, OPA announced on October 8 that manufacturers' prices of apparel items which contain rubber or elastic webbing as a component material—such as corsets, girdles, suspenders, elastic-top hosiery, bloomers, panties, shorts, pajamas and gloves—are included under the provisions of the new M.P.R. No. 220 covering certain rubber commodities.

The definition of "rubber commodity" in the regulation, it was pointed out, is so worded as to include those items of which rubber is an important part as well as those in which the use of rubber may be more or less incidental. Since under present restrictions on the use of rubber less and less will be used in wearing apparel and its use may soon be eliminated from all such items, the application of the pricing regulation may be considered a temporary one only as it affects these items.

Rubber Heels

A revised schedule of ceiling prices which shoe repairmen may charge for attaching rubber toplifts to women's shoes was announced by OPA on October 1. The new schedule, contained in Amendment 2 to Maximum Price Regulation No. 200, raises the maximum prices for attaching toplifts, but at the same time eliminates a previously permitted extra service charge for repairs made to the heel in the attaching process. In the revision, the price for both services is quoted in one lump figure instead of separately as heretofore.

COMPARISON OF SYNTHETIC RUBBERS MADE BY BARUCH COMMITTEE

A comparison of the relative merits of the various types of synthetic rubbers being produced in the United States was made public on October 7. The comparison is contained in a special appendix on "The Chemistry of Synthetic Rubber" prepared by the Baruch Rubber Committee. Although this appendix was submitted by the Committee to the President along with its report last month, a digest of which appeared in our last issue, it was not made available until October 7. The complete appendix is reproduced in full on Page 58 of this issue.

According to the appendix, Buna S, foundation of the Government's synthetic rubber program, is particularly well adapted as a material for tires and will give up to 90% wearability as compared with crude rubber. It is also "apparently satisfactory" for inner tubes, the Committee reports, and will play a part in the recapping program.

With suitable compounding, the report continues, successful tires up to 7:00 can be made entirely out of Buna S. In the larger truck, heavy duty and combat sizes a certain amount of natural rubber has thus far been found necessary in the sidewalls and carcasses. In the Committee's opinion, however, not more than 20% by weight of a heavy Buna S tire would have to be crude rubber and the tire industry "believes that this percentage may be reduced to 10%, perhaps lower."

DISTRIBUTION PLANS

Distribution plans covering synthetic rubber produced in Government-owned plants have been changed. According to Circular No. 9 distributed by the Rubber Reserve Co. on September 28, WPB will, for the present, allocate all synthetic rubber produced in these plants, regardless of the quantity involved or the intended use therefore, and all requests should now be addressed to R. F. Wolf, Synthetic Rubber Allocations Section, Rubber & Rubber Products Branch, War Production Board, Washington, D. C. No further requests for the purchase of synthetic rubber should be addressed to Rubber Reserve. Heretofore, experimental quantities up to and including 200 pounds per month could be obtained without a WPB allocation by writing direct to Rubber Reserve.

Rubber Reserve, according to the circular, will sell synthetic rubber produced in the Government-owned plants to consumers, as available, in accordance with the allocation schedules issued by WPB. For the time being, distribution of such rubber will be made by operators of the synthetic plants as agents for Rubber Reserve, in accordance with Synthetic Rubber Shipping Authorization (RuR Form S-7). Copies of this form will be sent to the consumer and to the operator of the plant which will make the delivery.

It was pointed out that upon receipt of the Synthetic Rubber Shipping Authorization the consumer should immediately execute and forward to the designated Government plant operator a purchase order, in duplicate, accompanied by appropriate shipping instructions. This matter should receive prompt attention since the official Authorization form specifies the month during which the material will be shipped and in the event that a purchase order is not received by the plant operator prior to the end of such month, the allocation and authorization are automatically cancelled.

Government Synthetic Prices

Circular No. 9 also covered the prices to be paid for the various Government synthetic rubbers, as follows:

Buna S: This material is now available for sale from the production of plants operated by Goodyear, Firestone and U. S. Rubber, as agents for Rubber Reserve. Buna S is sold at a price of 50c per pound, f.o.b. point of shipment, and the consumer will be invoiced for the material by Rubber Reserve. All invoices are payable within ten days.

Neoprene GN: This material will be available for sale in October from the production of the plant operated in Kentucky by DuPont. Neoprene GN will be sold at a price of 65c per pound, f.o.b. point of shipment, and, as in the case of Buna S, the consumer will be invoiced by Rubber Reserve, the invoices being payable within ten days.

Thiokol and *Butyl:* Consumers will be advised when these types of synthetics are available for sale by Rubber Reserve.

Exempt Conversion Charges

Charges which may be made for the service of converting raw materials supplied by a customer into synthetic rubber were exempted on September 29 by OPA from the General Maximum Price Regulation and M.P.R. No. 165 (Services). The action was contained in Amendment 4 to Revised Supplementary Regulation No. 11 of the General Maximum Price Regulation.

The exemption follows OPA's policy of permitting complete price flexibility during the formative stages of the synthetic rubber industry, considered most essential and vital to the war effort. Previously, under Amendment 7 to Supplementary Regulation No. 11, sales or deliveries of synthetic rubber and the materials used in the production of synthetic rubber were exempted from the general regulation.

As in the case of the earlier exemption, the latest amendment requires the filing of copies of all contracts entered into for the performance of the services exempted, so that OPA may be kept informed of the fees or charges for these services.

HAUSER TESTIMONY

Even before the Baruch Rubber Committee rendered its official report to President Roosevelt, some criticism on the selection of Dr. Ernst A. Hauser, associate professor of chemical engineering at M.I.T., and a recognized expert on colloidal chemistry, as one of the chief investigators for the committee was voiced by members of the Senate Agriculture Subcommittee, which has been investigating the rubber situation.

Senator Norris, a prominent member of the subcommittee, stated on September 26 that the committee had done an "absolutely inexcusable" act in appointing Dr. Hauser, who he termed a "prejudiced" chemist. The Senator charged that Dr. Hauser's written opinions, especially those in the book *Rationed Rub-*

ber which he recently co-authored, brand him "as a man prejudiced against the manufacturing of synthetic rubber from grain alcohol." The subcommittee has been trying to force the widespread use of grain for the production of butadiene by legislation, including the construction of processing plants in farm areas.

Called before the subcommittee by Chairman Gillette, Senator from Iowa, on October 2, Dr. Hauser first explained that he was not taken on by the Baruch Committee to investigate any of the chemical processes for making synthetic rubber that were under consideration, but that his job as a consultant consisted of inspecting conditions under which scrap piles and latex were stored and assisting in the study of the possibilities of producing rubber from guayule, cryptostegia and other plants.

Dr. Hauser firmly denied that he had ever been connected in any way with the Standard Oil Co. of New Jersey or with any of its subsidiaries or affiliates, nor with any oil company whatever. He also denied that he had ever received remuneration of any kind either from Standard Oil or from I. G. Farbenindustrie. He was closely questioned as to why he so strongly favored the production of butadiene from petroleum in his recent book. Senator Gillette also took exception to various other passages in the book which dealt with the synthetic rubber problem.

NEW PRODUCTS

Although the synthetic rubber program is now definitely set, the search for new and better products continues. On October 1, Rubber Administrator Jeffers reported that a privately-financed pilot plant was being built to make "a rubber-like substance from by-products of dairy processors." He cautioned that the process was still in the test tube stage and offers no immediate relief as a rubber substitute, but added that "its potential promise is of value in connection with the long range program."

Mr. Jeffers also stated that experiments carried out on the new material from dairy by-products to date give some reason to hope that material suitable for recapping tires might eventually be developed in this manner, but said that even if present possibilities were fully realized "any substantial production is some time in the future." It was revealed, however, that the experiments had been conducted by the National Dairy Products Corp., which is financing and building the pilot plant, and that some development work on the new material has been done by Goodrich.

Some interest has also been expressed in a new rubber-like material that can be made from soybean or other vegetable proteins as described in a recent patent granted to Robert Brown of New York City. In the process, the beans are ground up and the fats and oils removed, leaving only the protein. The protein meal is then mixed with water and quicklime, stirred, and finally a clear yellowish viscous liquid is filtered out. Chlorine gas is bubbled through it and the liquid is allowed to stand for some time, during which coagulation or polymerization occurs. The inventor claims the resulting material is more elastic than natural rubber and has good tensile.

During the past month, U. S. Rubber put into operation the third of the Government-owned synthetic rubber plants. This plant, located in Connecticut, like those operated by Firestone and Goodyear in Ohio, was under construction prior to Pearl Harbor, and will eventually have an annual production capacity of 30,000 tons. It was also learned that an addition to the Government-owned plant operated by Goodyear in Ohio is being rushed to completion and should be in operation within a month or so.

BUTADIENE

Authorization to build a pilot plant for making butadiene from grain by first fermenting the grain to produce butanediol has been given to Joseph E. Seagram & Sons, Inc., by the Rubber Reserve Co., according to a statement made by Seagram on October 5. Rubber Reserve, it is understood, will assist Seagram in having a priority rating assigned which will make early completion of the pilot plant possible.

Preliminary estimates made by Seagram engineers indicate that a commercial size plant for producing butadiene from surplus grain by the new method, one capable of producing 20,000 tons of butadiene a year, can be built in from six to eight months from the time materials are made available and that the butadiene can be made at a cost of 15 to 20 cents a pound.

The pilot plant that has been authorized will be capable of handling 250 bushels of grain a day. Initial operation of parts of the process is expected by the middle of December, while completion of the entire plant is scheduled for the middle of January. Until the pilot plant is completed, Seagram will continue its experiments on the butanediol process in various parts of its distillery not needed for war alcohol production. Smith, Hinchman & Grylls, Inc., of Detroit, are understood to have designed the pilot plant and to have practically completed architectural details on a commercial plant.

In the meantime it was learned that the huge butadiene plant of the Carbide & Carbon Chemicals Corp. in West Virginia will begin production early in December using alcohol as a raw material. This will mark the initial production from a major unit in the Government synthetic rubber program insofar as basic raw materials are concerned. The annual capacity of the plant has been placed at 20,000 tons of butadiene.

The butadiene plant of the Sun Oil Co. in Ohio, which will utilize the Houdry Process as announced last month, will

Synthetic rubber coming through a tuber in the new government-owned plant put into operation in New England last month by U. S. Rubber. From the tuber the material goes into a drying oven and then into the mill where it is finished in sheet form.

have an annual production capacity of 15,000 tons, according to a WPB statement. This plant is expected to be in full operation by next March. The statement also revealed that national butadiene production would reach a rate of 13,300 tons annually by the end of September.

WPB also announced on October 2 that the entire production of the nation's distilled spirits industry would be diverted for war purposes after October 8. Directives have been issued to the industry to ship the entire production of "high wines" to redistilling plants for conversion into 190 proof industrial alcohol. The combined output of the industry is expected to reach 240 million gallons a year of industrial alcohol.

Important paper making interests are studying the prospect of substantially augmenting the vital wartime supplies of alcohol, needed for the production of smokeless powder as well as for butadiene, through use of wood sugars now wasted in the manufacture of paper. One survey privately made by paper authorities indicates that use of wood sugars now thrown away in the United States and Canada would produce a minimum of 70,000,000 gallons of alcohol annually, or approximately 70% of the additional alcohol capacity recommended by the Baruch Committee. One paper concern, the Ontario Paper Co., recently applied to WPB for priorities on distilling apparatus for this purpose, as reported in our last issue.

RUBBER AGREEMENTS ARE SIGNED WITH MEXICO AND PANAMA

Two additional contracts have been signed with Latin American countries since our last issue—Mexico and Panama. This brings to 15 the number of such agreements, previous ones having been signed in order with Brazil, Peru, Nicaragua, Costa Rica, Colombia, Bolivia, Ecuador, Honduras, Trinidad, British Guiana, British Honduras, El Salvador and Guatemala.

Like the previous agreements, that with Panama provides for the purchase by the United States, through the Rubber Reserve Co., of all rubber produced in that country until the end of 1946, except such amounts as may be required annually for essential domestic needs. That with Mexico, however, provides for the purchase of "any exportable surplus" of that country's tree rubber and all of its guayule and other plant rubber production.

Mexico's production of tree rubber is estimated at less than 6,000 tons per year, so that the United States will secure little such rubber, if any, from that country. Its production of guayule, however, is expected to reach 10,000 tons by the end of the year. Under the terms of the agreement, the United States will supply Mexico with enough tree rubber for her internal needs over and above an unspecified amount.

The agreement with Mexico also provides for the establishment of a "substantial development fund" by Rubber Reserve which will be used to develop the cultivation of guayule. The fund will be spent under the supervision of the Mexican and United States governments. In return for her concession on guayule, Mexico is assured of a definite amount of rubber products.

According to the Office of the Coordinator of Inter-American Affairs, reports from Mexico City indicate that the Mexican government's next budget will provide funds for five demonstration plantations, each with 750 acres, to serve as experimental farms and trading stations for the cultivation of Hevea trees. Some 250,000 trees for plantation expansion will be available for distribution in the next year and a half, according to the reports. These plantings, of course, represent a long-range development.

Besides guayule and the Hevea development, Mexico has large numbers of Castilla trees growing wild in its southern region. Tapping of these trees, however, raises a labor problem since they are often widely scattered and relatively larger labor forces are required for the gathering of rubber from closely-spaced trees on plantations. Lack of the tremendous labor reserves available to Far Eastern growers is regarded by authorities as the biggest single obstacle to quick expansion of wild rubber production throughout the tropical Americas.

Urges Contract Renegotiation

On October 9 the Senate Agriculture Subcommittee, headed by Senator Gillette, which is continuing its hearings on the entire rubber situation, turned over to the War Department the testimony of Major Wendell Dove, an Army medical officer who returned to this country last June after spending 15 years in various Latin American countries. Major Dove testified before the committee behind closed doors on October 8.

In his testimony, Major Dove stated that the United States might be able to procure as much as 1,500,000 tons of crude rubber annually from Brazil alone if it would renegotiate its present contracts for obtaining rubber from Latin America. He stated that the present contracts provide for the purchase of rubber at a price of 42c a pound and require the purchase of "a certain number of pounds of Brazil nuts for every pound of rubber." He advocated renegotiation of such contracts with provisions for payments of $1.00 per pound or more for the rubber and recommended "throwing away the Brazil nuts."

"A lot of money is being spent in the Amazon basin to promote and to talk people into getting more rubber out," said Major Dove. "If this money was put in the market, less talking and more rubber would result. Diplomacy and trade agreements will not take the place of supply and demand in the Amazon basin." He felt that it was a mistake to deal with governments only and not with private enterprise. This prevented individual firms from competing with each other for this nation's business, he said.

In concluding his testimony, Major Dove advocated the appointment of a competent military leader—with at least the rank of brigadier general—to deal with the people of South America for their supplies of rubber. The official, he stated, should be familiar with South American customs, language, and the temperament of the people, as well as have a thorough knowledge of the rubber situation.

WPB officials, although declining official comment on Major Dove's testimony, expressed considerable doubt that the United States could obtain some 1,500,000 tons of rubber from Brazil alone, to say nothing of Bolivia, Ecuador, Colombia or Venezuela, by boosting the price to $1.00 per pound. They pointed to past experience with Latin American production, which never topped 70,000 tons, even in 1910 when the price was $3.00 per pound.

The recent Baruch Committee report stated that imports from South America would be comparatively small and that the amount obtained would depend on the shifting of nearly half a million natives into the Amazon Valley, how many of them withstood the rigors of the jungle, and how successful we are in combating the menace of underseas raiders.

Wallace Explains Views

In an article on the rubber situation which appeared in the *New York Times Magazine* of July 12, Vice-President Henry A. Wallace included the suggestion that some of the synthetic rubber plants now under construction be disposed of after victory was won. This attitude was condemned by the *New York Daily News* in an editorial on September 8, in which that newspaper proposed the adoption of a high tariff on crude rubber to protect the synthetic rubber industry after the war. Mr. Wallace has since clarified his views in a letter sent to the *News*, through E. N. Bressman, director of the agricultural division of the Office of the Coordinator of Inter-American Affairs.

In his original article, Mr. Wallace stated in his letter, he pointed out that synthetic rubber from petroleum costs around 30c a pound and that rubber made from grain costs at least 40c a pound, whereas natural rubber in past years has cost around 20c a pound. Immediately after the article was published, the Vice-President began to receive letters from chemists and others who claimed that the cost of producing synthetic rubber will be greatly reduced in the future when quantity production gets under way.

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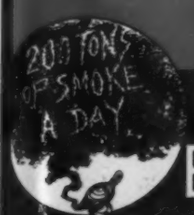

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Admitting such a possibility, Mr. Wallace wrote that any commodity which can be produced more efficiently and more cheaply in this country than elsewhere will certainly be produced here. If synthetic rubber can be produced and sold for less than the cost of natural rubber there will be no need for a rubber tariff "which is the real point at issue."

However, he added, most people do not realize the extent to which the cost of producing natural rubber can be reduced as a result of modern methods of production and the use of high-yielding strains of rubber trees. It seems almost certain that under normal conditions natural rubber can be laid down in New York for less than 10c a pound and possibly as low as 5c a pound.

To give us rubber security in the future, Mr. Wallace continued, it will not be necessary, year in and year out, to produce all of our supply synthetically. For future national rubber security it will be sufficient if we have plant facilities and technical knowledge for the production of synthetic rubber which we can quickly mobilize in case of sudden need, meanwhile pushing ahead with research that will keep improving the quality and reducing the cost.

Referring to the fact that most of the Latin American countries are now producing natural rubber and are going ahead with plans which within a few years will place them on an efficient rubber production basis, Mr. Wallace pointed out that regardless of whether our old Far Eastern source of rubber becomes available again we can look to a good supply of cheap natural rubber near at hand. A tariff wall to protect an "infant" synthetic rubber industry in this country, he wrote, would not only force our consumers to pay higher costs but would be a severe blow to these countries and their faith in friendship.

In concluding his letter, the Vice-President stated that "real national security in the broad sense cannot be obtained by attempting to be self-sufficient in everything as the Nazis during the last 10 years tried to do. This was the direction in which our Government was going under the Smoot-Hawley Tariff Act of 1930. Adoption by the United States of a new isolationism on the Nazi order, after this war is over, would force the rest of the world to do likewise and, as I have already pointed out, would lead within a few years to World War No. 3."

Rubber from Fig Trees

According to a report made in Cincinnati on September 15 by Dr. Alfred Lonsing to the Institutum Divi Thomae, research and graduate school, a new source of rubber has been found in Florida. Dr. Lonsing, leader of a group which has been conducting experiments at Palm Beach, reported that the new source is the *ficus aurea* or "Florida strangling fig" tree.

Dr. Lonsing told the delegates attending a special conference that latex of good quality had been derived from the sap of the fig tree and said that the latex might well be used for making an excellent grade of rubber. He could supply no information as to the possible yield of the trees.

Ficus aurea grows profusely but in scattered areas throughout Florida. As far as is known, nothing has been done about launching possible production, the report to the Institutum covering only the discovery and initial experiments.

New Use for Buna N

Substitution of Buna N (Perbunan) for leather on brake assemblies for railway cars results in a saving of 50% in the amounts of lubricating oils and greases required, according to claims recently made in the German technical press as reported by the Department of Commerce. Use of Buna N in place of the scarce and more expensive leather in Germany is claimed to have had good results from every angle.

GUAYULE

There is little doubt at this writing (October 13) that the Government's guayule program will be expanded considerably shortly. Based on the excellent results achieved by the directors of the Guayule Rubber Emergency Project at Salinas, California, the Senate passed legislation on September 21 authorizing the Department of Agriculture to increase the acreage of guayule from 75,000 acres (the maximum provided for in the original legislation) to 500,000 acres.

Senator Sheridan Downey, of California, sponsor of the initial bill as well as of the new legislation, told the Senate that according to C. M. Granger, Assistant Forest Service Chief, the guayule program will provide 33,000 tons of rubber by 1944 and that it would be possible to expand it to 80,000 tons annually. He also explained that the yield of guayule seed was eight times that anticipated, thereby allowing for a greatly expanded program.

The House Agriculture Committee approved the legislation on October 6. Grover B. Hill, Acting Secretary of Agriculture, told the committee that the Department's present program for cultivating guayule calls for the planting of 207,000 acres. On October 8, the Appropriations Committee sent its appropriation bill to the house including $19,000,000 for additional planting of guayule and $25,000,000 for additional processing plants. (EDITOR'S NOTE: The same bill contains authorization to spend $36,300,000 for non-rigid airships and provides for the expansion of barrage balloon construction to provide protection for merchant vessels).

Further Progress at Salinas

According to a letter dated October 3 received from Paul H. Roberts, Acting Director of the Guayule Rubber Emergency Project at Salinas, California, considerable progress has been made in recent weeks. A laboratory, or central station, for the Bureau of Plant Industry investigative work carried on in connection with guayule culture is being constructed. Two frame buildings are under construction, one the laboratory and the other an office building for the Bureau's personnel. A small pilot plant in which to carry on investigations to improve the processing of rubber from the shrub is also planned.

The seed-processing arrangement has been enlarged. Formerly, the seed was soaked in small perforated drums which revolved in water, the water later being drawn off and a hypochlorite solution substituted, the seed finally being dried in flats in the sun. Large concrete vats in which the seed is soaked while being mechanically agitated have been substituted for this arrangement and mechanical driers which reduce the moisture content to the proper point for storage are being used. The "presprouting practice has also been discontinued, since it has been determined that the seeds can be germinated satisfactorily without presprouting.

The field planting machine has been overhauled, a machine in which the planter merely inserts the plant in a clip in the end of a revolving arm, the plants being deposited in the slot by the arm, having been substituted for the type in which the planter places the plant in the slot. A number of these new machines are being readied for the Fall planting campaign.

Changes in Processing Plant

Changes are also being made in the processing plant. For one thing, Mr. Roberts writes, the shrub will hereafter be washed before milling to remove the dirt that comes up with the roots. The shrub drying and transmission equipment is also being improved.

For collecting the seed from the nursery beds, a two-wheeled cart which has narrow trays suspended from the axle which run between the rows in the nursery beds just clear of the ground has been developed. A chain and sprocket drive propels a rotary brush which brushes the tops of the plants, knocking the seed into the trays.

Two new nurseries will be established shortly in the southern part of California, one in San Diego County and the other in Riverside County. Still another nursery will be installed somewhere in the central part of the state this winter and will be seeded next spring. If everything moves along satisfactorily, the Project will have about 88,000 acres of field plantations next Spring and 208,000 acres by the Spring of 1944. Four nurseries will thereafter supply stock for an annual planting program of approximately 176,000 acres.

TIRES WILL BE MADE AVAILABLE FOR ALL ESSENTIAL CARS

As a direct outcome of the Baruch Committee report, OPA announced on October 10 that every motorist in the United States who obeys the speed and rationing regulations will receive enough recaps or used or new tires to keep his car rolling for essential purposes for the duration. To be eligible, however, the driver of essential cars must adhere to the following practices:

(1) Submit to periodical inspection of his tires to show that they are not being abused and to insure that they do not become worn beyond the point where they can be recapped;

(2) Keep within a 35-mile-an-hour speed limit; and

(3) Share his car with others on every trip as far as possible.

To make the plan feasible, a national stock-pile of all "idle" passenger car tires in the country is to be created. This does not mean taking spare tires for pool purposes, according to OPA, but cars with six tires will probably have to contribute one of their two spares and persons who have accumulated extra sets in preparation for emergencies will probably have to give them up. Passenger car tires in dealers' stocks will also go into the stock-pile.

National Gas Rationing

Earlier, on September 25, Rubber Director Jeffers ordered coupon rationing of gasoline on a national scale as a means of conserving tires. The measure will be carried out by OPA and will accord to other states the same allowances of gasoline granted since July 22 to car owners in the seventeen Eastern states where rationing is already in force.

In the directive ordering national gas rationing, the first since his appointment, Mr. Jeffers instructed OPA to put the plan into effect and at the same time ordered the ODT to review the program after it has been set up "from the standpoint of its effect upon the transportation service of the nation." Nation-wide rationing of gasoline was one of the recommendations of the Baruch Committee. Incidentally, according to a statement by OPA on September 28, studies of motor car operation in the East during the first two months of rationing under the coupon plan indicate that the estimated 7,200,000 passenger cars in the rationed area are averaging only 5,170 miles a year. The Baruch Committee recommended a 5,000-mile annual limit per car.

Warning that the Government's undertaking to keep tires on all passenger cars can be reached only if driving is brought within the 5,000-mile average recommended by the Baruch Committee, Leon Henderson, Price Administrator stated on October 10 that there are five steps in the present program, as follows:

(1) Rationing of used tires and recaps and new tires now in stock to provide as far as possible the minimum essential mileage to each of the nation's passenger cars.

(2) Actual control of each car's mileage through the rationing of gasoline to prevent unnecessary driving as far as possible, and to hold the national average down to 5,000 miles per car per year.

(3) Compulsory periodic inspection of all tires to guard against abuse and prevent wear beyond the point where they can be recapped.

(4) Denial of gasoline and tire replacements to cars whose drivers persistently violate the national 35-mile-an-hour speed limit for rubber conservation.

(5) Capacity use, through car-sharing, of every car on every trip as far as possible.

Quotas for October

Quotas of passenger car and truck tires for rationing in October were announced by OPA on September 26. According to this announcement the quota of recapped tires or recapping services was 457,561 as compared with 486,468 in September. On October 1, however, in compliance with the tire conservation recommendations of the Baruch Committee, OPA announced a supplementary recapping quota of 482,379 recaps for passenger car tires, bringing the total for October for such tires and services to 939,940. At the same time all passenger car operators who are eligible under the rationing regulations and whose casings are worn smooth were urged to apply immediately for recapping certificates to preserve the carcasses.

In only one other category—new tires for passenger cars with a List A eligibility rating—was the October quota larger than that of the previous month. This increase was made to take care of the needs of taxicabs, which were made eligible for new tires under restrictive conditions by Amendment No. 27 to the rationing regulations, as recorded elsewhere in this issue.

The quota of new passenger car tires for rationing in October was set at 60,676, compared with 38,297 for September, while the total of Grade II new tires for certain classes of war workers was 98,755 against 115,544. The October allotment of passenger car inner tubes was 315,138 against 333,450 for September. The truck tire quota for October was 202,840, as compared with 239,445 in the previous month, while the allotment of recapped tires and recapping services for trucks was 238,973 against 262,258. The truck tube quota was 225,620 against 262,261.

New Rationing Amendments

Several new amendments to the Revised Tire Rationing Regulations have been issued by OPA since our last report, as follows:

Amendment No. 26, issued September 3 and effective September 8, limits to fifty the number of sectional warehouses which a tire manufacturer is permitted to establish. This action was taken to avoid duplication of sectional stocks by competing manufacturers.

Amendment No. 27, issued September 11 and effective September 16, makes available superior quality recaps and in some cases new tires for taxicabs which heretofore were eligible for only the lower grade of recapping material that is used for private passenger cars and for no new tires at all. Taxicab operators are also permitted to enter into contracts on a payment-per-mile or "lease" basis. This action followed announcement of a new set of rules for taxicabs by ODT forbidding them to cruise, to operate more than certain distances beyond city limits, engage in delivery service, or to take passengers on sightseeing trips.

Amendment No. 28, issued September 26 and effective October 2, expands the list of obsolete tires, upon which there are fewer restrictions, to include all new passenger car tires fitting rims 18 inches or more in diameter. These sizes are used only by cars of 1934 model and older. Tires used on motorcycles manufactured before 1937 were also added to the list, which is expected to particularly benefit farm areas.

Amendment No. 29, issued September 26 and effective October 2, adds dental surgeons, itinerant dentists, and midwives who must drive cars in the performance of their work to the list of persons eligible for tires and tubes. To qualify, persons in these occupations must be licensed by the appropriate state authorities.

Amendment No. 30, issued September 26 and effective October 2, adds to the list of services which may be performed on rationed tires the use of vehicles to evacuate civilians from danger zones or places where they might interfere with military operations. Transportation of a jury, of prisoners or mentally disordered persons, and of persons between their homes and places of regular weekly worship where no other adequate transportation facilities exist is also covered in the amendment.

Amendment No. 31, issued September 28 and effective October 3, permits persons in the tire or automobile business, and some others, who have stocks of new tires or tubes, recapped tires or recapping material in public warehouses to remove them without the special authorization previously required. At the same time, permission is given for an owner to pledge his stocks of tires, tubes or recapping material as security for a loan from a state or Federal agency or others licensed to make such loans.

Amendment No. 32, issued September 29 and effective October 5, makes eligible for recapped tires authorized representatives of labor, management or government whose services are essential in avoiding or settling labor disputes in establishments necessary to the war effort.

Amendment No. 33, issued October 2 and effective October 8, makes eligible for recapped tires American Red Cross passenger cars that are necessary in the performance of services essential to the war effort or public health and safety. In addition, trucks that already are eligible for tires may be used alternately as

buses in certain services without disturbing their eligibility.

Amendment No. 34, issued and effective October 2, freezes the sale of used tires and tubes. This action was taken to keep intact the present supply of used tires pending completion of a rationing program which will govern the use of these casings just as the present rules apply to the uses of new and recapped tires. Certain exceptions to the freezing order are contained in the amendment.

Amendment No. 35, issued and effective October 5, changes the form of the tire rationing certificate issued to consumers and contains several revisions and simplifications in the procedure for its issuance and use. The new form, Revised R-2, will be a consolidation of the two forms previously used, one for new tires and tubes and the other for recapped tires or recapping services.

Amendment No. 36, issued October 6 and effective October 12, makes broad changes in and additions to those parts of the regulations governing principally the procurement and uses of camelback by retreaders and recappers. The changes fall within four classifications: initial allotments, inventories, return of recapped tires, and return of deteriorated camelback to the manufacturer for remilling. In the latter instance, the amendment provides for the return of the remilled camelback to the recapper without certificate.

Amendment No. 37 issued October 7 and effective October 13, makes eligible for recapped or Grade 2 new tires the cars of all members of a group-ride "club" in any war-essential establishment employing more than 100 persons. Previously, only one car for each group had been eligible. Grade 2 new tires are defined as those formerly classed as third, fourth and fifth lines.

Tires on Mileage Contracts

Maximum charges for the use of tires or tubes—new, used, retreaded and recapped—on bus mileage contracts or other rental or lease arrangements must be determined under Maximum Price Regulation No. 165 which puts the ceiling price of services generally at the March, 1942, level. To make this plain, OPA has issued amendments to three separate price regulations covering tires and tubes, adding a paragraph to each which states specifically that M.P.R. No. 165 is the one which applies to leasing and rental charges.

The amendments, all issued on September 16 and effective September 22, are No. 4 to Maximum Price Regulation No. 107, which covers used tires and tubes; No. 5 to Revised Price Schedule No. 63, which establishes retail ceilings for new tires and tubes; and No. 2 to Revised Price Schedule No. 66, which covers retreaded and recapped tires.

In addition, the amendment to Revised Price Schedule No. 66 adds a section explaining that persons selling at wholesale or retail any retreaded or recapped tires are licensed under the General Maximum Price Regulation and that persons selling the service of retreading or recapping any tire are licensed under M.P.R. No. 165. Similar licensing provisions already have been included in the two other regulations.

More on Wooden Tires

Wooden tires for use in Alaska, the Panama Canal zone and Egypt will soon be manufactured on a mass production scale by the Udell Works of Indianapolis, Indiana, according to an announcement made on September 15 by Onon Moore, of Indianapolis, inventor of the process to be used. The tires are built in 16 wedge-shaped segments. In mounting, the wheel is set on its side on the ground, the segments are placed in position, and a cable is fixed about the center of the tread running around the tire. This is tightened by a turnbuckle until the segments are in position.

Two steel bands, threaded on the ends, are then imbedded in a groove in the sidewalls which runs around the tire. These fit through a steel plate against which nuts are tightened to hold the tire in place after removal of the circumference ring. The tighter the sidewall bolts are pulled the more wear the tire can take, according to the inventor. The wooden tires, it is claimed, will travel present-day roads at 40 miles an hour without injury, although riding is rougher than on ordinary rubber tires.

MISCELLANEOUS ORDERS

Several additional orders of direct interest to the rubber industry have been issued since our last issue, as follows:

Polyvinyl Chloride: General Preference Order M-10, which sets up an allocation system for polyvinyl chloride, was amended by WPB on October 10 to cover all vinyl polymers. All of these materials are used as rubber substitutes and many are interchangeable.

Polyvinyl Butyral: Supplementary Order M-154-a, which places polyvinyl butyral under allocation control, was revoked on October 12 by WPB. As indicated above, G.P.O. M-10 was amended to include all vinyl polymers, thus obviating the need for the special order.

Vinyl Acetate: General Preference Order M-240 placing vinyl acetate, used in the manufacture of rubber substitutes and in the synthesis of sulfa drugs, under complete allocation control was issued by WPB on October 8. Allocation takes effect on November 1.

Furfural: Agricultural components of furfural, used in making butadiene, in refining petroleum crudes and as a plastic binder, were exempted from price control by the issuance of Amendment 30 to Supplementary Regulation 1 of the General Maximum Price Regulation by OPA on September 29. Products affected include cottonseed hulls, oat hulls and other agricultural commodities which may be used in the production of furfural at a later date.

CHEMICAL RECLAIM PROCESS ANNOUNCED BY BOSTON HOSE

A new chemical process for reclaiming rubber was revealed by John M. Bierer, factory manager of the Boston Woven Hose & Rubber Co., at Cambridge, Mass., on October 7. The process was originally to have been described in a paper before the meeting of the Rubber Division, A.C.S., at Buffalo last month

John Bierer and J. P. Coe, who is president of the Rubber Reclaimers Association, examining the worn side of a tire recapped with ordinary reclaim.

but the paper was withdrawn at the last minute at the suggestion of the Office of Censorship. It was, however, presented to a special meeting of the Rubber Reclaimers Association held on October 2.

According to Mr. Bierer, the new chemical process makes possible tire recaps with a life of 18,000 miles or more in contrast with 5,000 to 10,000 miles for recaps made of reclaim produced by existing methods. It does away with the destructive heat and oxygen treatment of existing methods and the reclaim leaves the mills in 12 minutes instead of requiring some 20 hours of "cooking" as at present.

Mr. Bierer also pointed out that in existing reclaiming methods the finished reclaim loses most of its tensile strength whereas in the new chemical process most of the tensile is retained. Superior abrasion resistance is also claimed for reclaim made by the new process. On the occasion of the Cambridge announcement and at the meeting of the reclaimers group, Mr. Bierer exhibited a tire, half retreaded with camelback made from present reclaims and half with camelback made from reclaim produced by the new process, indicating that after 6,000 miles the half made with present day reclaim was worn smooth while the other half retained a heavy tread.

Although Boston Woven Hose & Rubber has patented the formula used in the new chemical process, the process is being offered royalty-free for the duration to all American companies.

APPENDIX TO THE BARUCH RUBBER COMMITTEE REPORT

on the Chemistry of Synthetic Rubber

Strictly speaking, no material has yet been produced which warrants the name of synthetic rubber—at least in the sense in which we speak of many other synthetic substances. Synthetic indigo, for example, is identical in every way with the dyestuff prepared from the indigo plant. Likewise synthetic camphor may be manufactured which is identical in every way with the substance obtained from the camphor tree. On the other hand no one of the synthetic rubbers so far developed—and at least a thousand more or less rubberlike substances have been produced—is exactly the same as natural rubber either in its chemical make-up or its physical properties.

The molecules in natural rubber are of very great size and are constructed by the multiplication of a basic unit composed of five carbon atoms. This unit is known as isoprene. Rubber-like materials have been prepared synthetically by starting with artificially manufactured isoprene and causing the units to combine together to form a large molecule.

Although such material is identical with natural rubber in chemical composition it still differs appreciably in physical properties because the artificial conditions under which the isoprene units combine do not produce the same-size molecule with exactly the same architecture as that found in nature. If isoprene could be manufactured readily it might well be the best raw material for the manufacture of a synthetic rubber. Lacking any process for the production of isoprene economically on a large-scale basis, chemists have turned in their studies to closely-related simple chemical compounds.

One of these is butadiene which differs from isoprene in having four carbon atoms in its structure instead of five. Another is chloroprene which differs by having four carbon atoms and a chlorine atom.

The molecules of butadiene may be caused to combine together by the action of metallic sodium to form a rubber-like material often known as Divinyl rubber. This is the synthetic rubber which has been produced in Russia for a number of years. On the other hand, the molecules of chloroprene will combine to form a giant molecule with rubber-like properties known as Neoprene. This product has been commercially in production in this country for a number of years. All of these processes by which small molecules join up to form a large one are known as polymerization.

It has been found in recent years that highly satisfactory rubber-like materials may be formed by allowing mixtures of butadiene and relatively small amounts of other compounds to polymerize. In this chemical reaction, large molecules are formed in which both the butadiene unit and the other molecule are built into a large and complex aggregate. When two or more different kinds of molecules are involved in the polymerization the process is known as co-polymerization. The material which results when styrene and butadiene are co-polymerized carries the name Buna S. This is the synthetic rubber which will be produced in largest quantities under the present Government program.

Another co-polymer which has recently received considerable attention is that known as Butyl rubber. This material results from the co-polymerization of isobutylene and small quantities of butadiene or isoprene. Flexon is the name given to a Butyl rubber which is prepared in a special way requiring little apparatus but the maintenance of low temperatures by the use of solid carbon-dioxide (dry ice).

Butadiene and Its Cousins

To complete the picture as it applies to the projected program for the supplying of synthetic rubbers in this country, there should be considered briefly the manufacture of butadiene, chloroprene, and isobutylene, which are the basic constituents in the processing of Buna S, Neoprene, and Butyl rubber.

Butadiene is a close relative of a compound known as butane which occurs in large quantities in natural gas. Butadiene differs from butane only by reason of its relatively smaller content of hydrogen. Even closer in its relationship to butadiene than butane, however, is the gas called butylene which is a by-product of the petroleum-cracking process for the manufacture of gasoline.

All these three substances—butane, butylene, and butadiene—have four carbon atoms per molecule; they differ only in their degree of dehydrogenation—that is, in their content of hydrogen atoms. Butane has 10 hydrogen atoms, butylene has 8, and butadiene 6.

It sounds as though it should be an easy matter to ring the changes between these various gases by the removal of hydrogen atoms. In practice it is by no means simple. In general it takes high temperatures and special substances known as catalysts to dehydrogenate molecules, and butane and butylene are no exception. However, it can be done and the process of manufacturing butadiene from the other two petroleum compounds depends on either the removal of four hydrogen atoms from butane or of two hydrogen atoms from butylene.

It is unfortunate from the point of view of endeavoring to give a simple explanation of the chemistry of rubber synthetics that the situation is still further complicated by the intrusion of the material called isobutylene in the rubber picture. Isobutylene contains the same numbers of carbon and hydrogen atoms as does butylene, and differs from butylene only in the architecture of the molecule—the arrangement of the atoms. Because of this difference it is only distantly related to butadiene and cannot be converted into butadiene. As has been pointed out, however, it has the ability of being co-polymerized with small quantities of isoprene or butadiene to form Butyl rubber.

Both isobutylene and its cousin, butylene, share one characteristic in common, namely, that both are valuable materials for the manufacture of high quality aviation fuel—in other words, high octane gasoline. The importance of this fact to the war program rests in the interconnection of the preparation of butadiene from petroleum and the manufacture of aviation fuel and other petroleum products.

Finally, the fact must be recorded that relatively small quantities of butadiene and still smaller amounts of isoprene are formed when gasoline or higher boiling mixtures of hydrocarbons are subjected to the cracking process; i. e., heated to a high temperature. This "thermal process" of manufacturing butadiene has been in operation in this country on a considerable scale for several years.

However, in previous high-thermal cracking, butadiene has appeared as a by-product. Hence this source is not available for the manufacture of the great quantities of butadiene needed for the present synthetic rubber program. The sizes of plants required for manufacture of butadiene by this method would be excessive and the disposal of the main products of the process a major problem; furthermore, because of the high temperatures employed (1300 degrees Fahrenheit), the life of some of the crucial equipment is short.

This is the reason why the chief reliance in the Government rubber program, insofar as petroleum is concerned, has had to be in processes starting from butane or butylene.

Alcohol Processes

In addition to petroleum products, alcohol may also be used for the preparation of butadiene. This can be accomplished in several different ways, which amount to the union of two two-carbon units of alcohol into the four-carbon butadiene unit by the processes of dehydration and dehydrogenation — that is, by the loss of water and the loss of hydrogen.

The Germans employ four steps in this process. The American process, by which one-quarter of the butadiene under the Government rubber program will be manufactured, accomplishes the same transformation in two steps. The Russian and Polish processes accomplish the entire transformation in a single step by the use of a special catalyst.

It should be remarked here that in the public discussion of the various processes of manufacturing butadiene

from either alchol or petroleum there has been a tendency to lay altogether too much stress on whether a process involved one step or two steps. Actually in all the processes there are many separate phases from the point of view of the chemical engineer and only a detailed analysis of the very complicated blueprints of the plant layout enable one to pass judgment on the comparative simplicity and merits of the operation. In one of the plants for the manufacture of butadiene under the Government program, for instance, over 600 separate engineering drawings are required.

Alcohol can be prepared by the fermentation of carbohydrates material, such as grain or molasses, or from the carbohydrates found in sawdust or sulfite liquors from wood pulp manufacture. It also can be manufactured from ethylene which, in turn, is a by-product of petroleum, or from acetylene which is manufactured from limestone and coke.

These many routes, starting from widely unrelated materials and all passing through the alcohol process for the production of butadiene and eventually of Buna S rubber, have led to the appearance in print of many erroneous chemical interpretations and conclusions. For instance, we may speak of Buna S as being manufactured "essentially" from wood-pulp or grain or petroleum or limestone and coke, and yet in each case we might be endeavoring in simplified language to describe the preparation of butadiene through a single route —the alcohol route—and its subsequent conversion to Buna S or Divinyl rubber.

Still another process for making butadiene from grain has recently been developed and is being experimented with by the Department of Agriculture in its laboratories at Peoria. This involves a special fermentation of the grain to produce butylene glycol, which, in turn, through a series of chemical reactions, is turned into butadiene and then into Buna S rubber.

Neoprene

We have mentioned that the Germans, as far as is known, start their process from limestone and coke. At this point we may conclude our account of the chemistry of these substances by a description of the American product Neoprene, which also traces its ultimate origin to the same substances.

In a high-temperature electric furnace, limestone and coke yield calcium carbide which when treated with water gives acetylene. The Germans transform acetylene to butadiene by a four-step process, which is essentially one of the alcohol routes for the manufacture of this gas. In this country two molecules of acetylene are combined and a molecule of hydrochloric acid (which comes from salt) then added. The product is chloroprene—the four-carbon compound which differs from isoprene, the unit of natural rubber, by reason of the presence of one chlorine atom. Chloroprene is polymerized to Neoprene.

One final basic fact regarding synthetic rubbers must be mentioned. To manufacture tires from either natural or synthetic rubber, the material of the tire must be (a) milled and (b) compounded; then the tire must be (c) built and (d) vulcanized or cured. All four processes depend on the nature of the rubber-like substance or substances used in fabrication. Buna S and Neoprene resemble natural rubber more closely in structure than Butyl rubber. Hence they can be milled and cured more nearly in the same way as natural rubber.

Buna S, Neoprene, and Divinyl may properly be regarded as members of the same family as natural rubber. Other synthetic rubber materials now in the public eye are more distantly related. Chief among these now much discussed is Thiokol. It is manufactured from ethylene chloride (a product of ethylene and chlorine), sulfur, and caustic soda. The architecture of the Thiokol molecule bears little resemblance to that of natural rubber—in its structure a sulfur atom plays a predominant part.

Other rubber-like materials have been manufactured by the preparation of large molecules by various chemical reactions from a wide variety of natural products. The starting point of these processes has varied widely. They may be oil from soya beans or, as in another case, lactic acid (a by-product of the manufacture of casein from milk). To date insufficient data are available both as to the manufacture of these compounds and their possible use as rubber substitutes to warrant our relying upon them for a significant part in our immediate rubber program. The inadequacy of our present stockpile of natural rubber for a long war and the need for an early production of synthetics to supplement that stockpile make it imperative that we turn to those substances from which production in substantial amounts before the end of 1943 seems best assured.

Nevertheless, one of these relatively untried substances may prove to have important uses either for recapping or for the manufacture of tires, or for substitution in other rubber products. Therefore experimentation in and adequate testing of all such substances and of others which should be developed should be encouraged. At the same time it is to be hoped that extravagant claims as to the merits of such pro-substances can be kept out of the public press, until full data for a competent evaluation are available.

It must be remembered by the public that a complicated series of chemical reactions are involved in the manufacture of any rubber-like substance from common raw materials. Each step requires long experimentation, protracted engineering study, and time for construction. Some day it may be possible to prepare a rubber substitute with a less elaborate procedure than now used for the manufacture of butadiene or Neoprene, but it is not within the range of prudence to count upon any such process to yield significant quantities of rubber substitutes within the next two years for military purposes, nor can anyone hope for any similar solution of the civilian tire problem in the same period.

Synthetic Rubbers

To round out this discussion of the chemistry of synthetic rubber, the differences in the various rubbers produced by these processes might be explained:

Buna S is the mainstay of the present synthetic program. It is particularly well adapted as a material for tires, showing wearing qualities as a tire tread material approximately 90 percent of those of crude rubber. With suitable compounding, successful tires in sizes up to 7.00 can be made entirely out of Buna S. In the larger truck, heavy duty, and combat sizes a certain amount of natural rubber has thus far been found necessary in the sidewalls and carcasses of the tires.

On the basis of presently developed art it seems safe to state that not over 20 percent of the entire weight of a heavy duty Buna S tire would have to be crude rubber. The tire industry believes that this percentage may be reduced to 10 percent, perhaps lower.

Buna S has about the same density as natural rubber and can be vulcanized with sulphur, zinc oxide, and regular accelerators. It requires a plasticizer to facilitate processing. Buna S is an excellent material for the insulation of wires subjected to very rough usage, provided it is covered with a layer of some better weather-resistant material such as Neoprene.

Neoprene is the synthetic material most nearly similar in its general utility to natural rubber, although its density is about one-third greater. It is more oil-resistant than natural rubber and has good aging properties and can be vulcanized with metallic oxides, with sulphur acting as an accelerator. Neoprene is excellent for heavy duty tires, being the approximate equivalent of natural rubber in ordinary service and definitely superior to natural rubber when run over ground containing flinty or other sharp materials likely to damage the tires.

Butyl has inferior abrasive qualities to Buna S or Neoprene but is characterized by a very high degree of impermeability to air and other gases. It has excellent properties for electrical insulation and heat resistance and requires a relatively high temperature for vulcanization with sulphur, zinc oxide, and accelerators. It is only recently that means have been found to attach Butyl to natural rubber or to Buna S or Neoprene, because of the very different degrees of saturation of the constituent carbon atoms. For this reason its use in tires was until recently considered only possible for whole tires but it now appears that it may

BARUCH APPENDIX (Cont'd)

prove capable of being used as a recapping material also.

Flexon is chemically similar to Butyl and differs in that it can be produced at dry ice temperatures simply by mixing the constituents in an open vat. In its production, however, about half of the isobutylene is lost. Isobutylene is a valuable constituent for making aviation gasoline. Also, because of its method of preparation, Flexon is inferior to Butyl, apparently because of lack of homogeneity. It is probable that its quality will be considerably improved with further developments in the art of its production. In general, it can be considered to be an inferior type of Butyl but one which can be produced with a minimum use of critical materials in the production plant.

Thiokol is brought into the program principally for two reasons: first, because it is a quickly producible material for recapping natural rubber tires, and, second, because it is exceedingly resistant to oils and various other chemicals which attack natural rubber. Thiokol has an unpleasant odor and produces somewhat the effect of tear gas, though in recent forms of Thiokol this objectionable feature has been considerably reduced. As a recapping material its wearing qualities are definitely inferior to Butyl and about equal to the present types of reclaimed rubber.

In all of these synthetic materials an important consideration is the speed with which they can be processed in the various operations of milling, mixing, compounding, tire building, and vulcanizing, since on this speed depends the capacity of the rubber milling equipment to handle these materials. The accompanying chart gives the general status of these synthetic materials as of the time when the Committee's report was written. It should be emphasized, however, that very rapid developments are being made in the processing arts so that it is reasonable to expect that the situation as regards manufacturing efficiency may be more favorable six months from now.

Here follows a chart comparing various synthetics and reclaimed rubber with crude rubber as a tire and recap material.

Recent OPA Interpretations

Recent price interpretations pertaining to rubber and rubber products announced by OPA include the following:

(1) New tires from which the beads are removed are not subject to Price Schedule No. 63 (Retail Prices for New Rubber Tires and Tubes).

(2) A sale of tires to a State Highway Department for the use of that department is not a sale at retail and is therefore covered by Price Schedule No. 63 and not by Regulation No. 143 (Wholesale Prices for New Rubber Tires and Tubes).

(3) Maximum Price Regulation No. 149 (Mechanical Rubber Goods) covers rubber automobile floor mats.

(4) If goods are sold at an open price because they are tailor-made, the reports of the maximum price determined under Maximum Price Regulation No. 149 (Mechanical Rubber Goods), as required by paragraphs (b) and (c) of Section 1315.28, must be filed within ten days after the purchaser has agreed to buy the goods. Since the goods are sold at an open price, the company need not report the selling price until the goods are manufactured.

COMPARISON OF SYNTHETIC RUBBERS AND RECLAIMED RUBBER WITH CRUDE RUBBER AS A TIRE AND RECAP MATERIAL *

	Manufacturing Efficiency	Tread Wear	Carcass Failures	Suitability as a Recap	For Inner Tubes
BUNA S (new tires and recaps).	*Good*— Mixing ... 40-70% Building ..80-100% Curing 100%	*Good*—Tests show about 90% mileage of crude rubber.	*None*—If 10% crude rubber is used.	*Good*—Tests show about 90% mileage of crude rubber. Curing time about the same as crude rubber.	Apparently satisfactory.
NEOPRENE (new tires and recaps).	*Good*— Mixing ... 40-65% Building ..75-100% Curing ... 50%	*Good*—90% mileage of crude rubber at normal speeds; 125% under severe service.	*None*—No carcass failures reported in tires tested recently. Some failures in earlier tests.	*Good*—Tests show 90-110% mileage of crude rubber recaps. Curing time longer.	Apparently satisfactory.
BUTYL (new tires).	*Good*— Mixing .... 100% Building ... 100% Curing 70-75%	*Fair*—40-50% of mileage of crude rubber.	*Frequent*—65% of first tires failed, largely due to blisters which developed in the manufacturing process.	*Promising*—Adhesion with crude rubber was poor at first, but a recent development appears to have overcome this difficulty.	May be developed, but not yet satisfactory.
FLEXON (new tires).	*Fair*—Similar to experience with Butyl. Manufacture slow; material soft and sticky.	*Poor*—Mileage in tests not more than 40% that of crude rubber.	*Frequent*—Tread and ply separation common in the few tires tested. Later tests show improvement, as with Butyl.	*Promising*—Same difficulties as with Butyl.	Unsatisfactory.
THIOKOL (recaps).	.....	*Poor*—Thin, smooth recap gave only 14% of mileage of crude rubber; 28% for comparable thickness. Regular non-skid tread gave 20%.	.....	*Good*—Curing and cooling time somewhat longer than for crude or reclaimed rubber recaps.	Unsatisfactory.
RECLAIM (new tires and recaps).	*Good*—Equal efficiency in milling, etc.; cures somewhat faster than natural rubber.	*Poor*—About 20-25% mileage of crude rubber.	*Infrequent*	*Good*—Curing time same as for crude rubber.	Fairly satisfactory.

* Comparisons are based on average experience in latest tests, operating at speeds around 40 miles per hour. The mileage life of a crude rubber tire at this speed is considered to be about 35,000 miles.

Biographies of WILLIAM MARTIN JEFFERS *Rubber Administrator* and COL. BRADLEY DEWEY *Deputy Rubber Administrator*

William M. Jeffers

WILLIAM MARTIN JEFFERS

William Martin Jeffers, president of the Union Pacific Railroad, was appointed Rubber Administrator by Donald Nelson, WPB Chairman, on September 15. He has been granted full authority (as detailed elsewhere in this issue) over the complete rubber program and is responsible only to Chairman Nelson and President Roosevelt. He is already actively at work on his new duties.

Mr. Jeffers is 66 years old and is one of the most colorful figures in the railroad world. He has spent 52 of his 66 years in the service of Union Pacific, the only railroad for which he ever worked, his father having been exclusively a U.P. man before him. On his elevation to the presidency of the road on October 1, 1937, he stated that it was a greater thrill "to become president of the Union Pacific than to be elected president of the United States."

"Bill" Jeffers, as he prefers to be called, was only 14 years old in 1890 when he started working as a call boy and messenger for Union Pacific at North Platte, Nebraska, where he was born and where his father, William J. Jeffers, was employed in the railroad's shops. Bit by bit he learned railroading, serving as a maintenance clerk, timekeeper, extra foreman of a steel gang, telegrapher, train dispatcher, chief dispatcher, trainmaster, assistant superintendent and superintendent.

Shortly after being appointed superintendent of the Nebraska District in 1915, Mr. Jeffers was named general superintendent, with supervisory authority over all divisions of Union Pacific, at that time one of several separate "units" which made up the "system." Less than a year later he was named general manager and on July 1, 1917, he became vice-president and general manager. On October 1, 1928, he was elected vice-president in charge of operations of the entire Union Pacific system and for the first time was in complete authority over all of the company's properties and "units." These "units" are now all integral parts of the Union Pacific Railroad Co., with approximately 10,000 miles of track. On August 11, 1932, the post of executive vice-president was created and Mr. Jeffers was given the title. Five years later he was elected to the presidency, a post he still holds.

Mr. Jeffers is credited with the development of several railroad operating practices which have benefited both passengers and employees, including safety measures, low fares, low meals, free pillows, free porter service and exclusive cars for women and children on certain special trains. He also organized the "Old-Timers Clubs," of which there are now 22, in Union Pacific, membership being reserved for employees with 20 years or more of service. It is one of Mr. Jeffers' proud boasts that he has never lost touch with the rank and file of the railroad and claims he can call 10,000 Union Pacific men by their first names.

Mr. Jeffers was married to Lena A. Schatz, of North Platte, in June, 1900. She, too, was the daughter of a Union Pacific employee.

Col. Bradley Dewey

COL. BRADLEY DEWEY

One of Mr. Jeffers' first official actions was the appointment of Col. Bradley Dewey as Deputy Rubber Administrator. The appointment was announced on September 30. Col. Dewey is president of the Dewey & Almy Chemical Co., Cambridge, Mass., has been acting as a consultant on rubber to the Army Quartermaster Corps, and holds a distinguished service medal for his work as chief of the Gas Defense Division of the Chemical Warfare Service in the last war.

Born in Burlington, Vermont, on August 23, 1887, the son of Professor Davis R. Dewey and Mary Hopkins, Col. Dewey graduated cum laude from Harvard in 1908, completing the course in three years. He worked for a year as a laborer in a copper smelting mine in Montana before entering M.I.T., where he received a degree in chemical engineering.

After being graduated from M.I.T., Col. Dewey went to work for the American Sheet and Tin Plate Co., spending the first year as a laborer in various departments to get some basic information of the steel industry. Later, he was selected to organize a research department for the company. He continued with the company as director of research until April, 1917, when he was borrowed by the War Department to pioneer its defense program against poisonous gases. He left the Army as a colonel.

After the war, in 1919, in conjunction with Charles Almy, a war-time associate, he founded the Dewey & Almy Chemical Co. at Cambridge, Mass. Today, the company has plants in Cambridge, Chicago and Oakland, Calif., as well as plants in London, Melbourne, Montreal and Buenos Aires. While not a rubber company, Dewey & Almy have always used rubber as an important raw material, their laboratories have specialized in research on rubber and rubber dispersions, they were the second concern in the country to use latex on a commercial scale and one of the first to adopt reclaim dispersions. In December, 1941, the company was granted priorities to erect a plant for making Buna S with its own funds and this plant went into operation in August of this year.

Col. Dewey is widely known for his research and development work, particularly in the development of sealing compounds for tin, glass and steel containers; for cast latex products, such as meteorological balloons and flexible rubber pails for munitions; for shoe products, such as cements, insoles, outsoles and welting; for dispersing agents and grinding aids for Portland cement and the chemical industry; and for synthetic rubber.

Since his retirement from the Army in 1919, Col. Dewey has served as a consultant to the Chemical Warfare Service, although, as stated, in recent months he has been acting as a consultant on rubber to the Quartermaster Corps. He is a member of many scientific societies and a life member of the Corporation of Massachusetts Institute of Technology.

SEVERAL NEW COMMITTEES ARE ORGANIZED BY W.P.B.

Several new committees to help further the war effort were recently organized by the War Production Board. These included a committee of engineers and scientists to determine the manner in which the projected Office of Technical Development should be set up within the Board and to define the scope, functions and method of operations which the new Office should have. The decision to establish the Office was made some time ago following a report by a previous committee.

Chairman of the special committee is Webster N. Jones, Director of the College of Engineering of the Carnegie Institute of Technology at Pittsburgh. Other members are: Dr. Lawrence W. Bass (New England Industrial Research Foundation); Dr. Oliver E. Buckley (Bell Telephone Laboratories); Col. Clarence E. Davies (Army Ordnance Department); Dr. R. P. Dinsmore (Goodyear Tire & Rubber Co.); Admiral J. A. Furer (U. S. Navy); Dr. Jerome C. Hunsaker (Mass. Institute of Technology); H. W. Graham (Jones & Laughlin Steel Corp.); and S. D. Kirkpatrick *(Chemical & Metallurgical Engineering)*.

Other committees recently organized, all of which will function under the WPB Division of Industry Advisory Committees, together with their members, follow:

Carbon Black: Reid L. Carr (Columbian Carbon); Thomas D. Cabot (Godfrey L. Cabot); R. H. Eagles (Huber); L. C. Herkness (Charles Eneu Johnson); C. E. Kayser (National Gas Products Assn.); Oscar Nelson (United Carbon); T. P. Walker (Thermatomic Carbon); H. M. Wilgus (General Atlas); and Robert I. Wishnick (Continental Carbon). The Government presiding officer is E. H. Bucy, Chief, Protective Coatings Section, Chemicals Branch, WPB.

Titanium Pigments: Paul E. Sprague (American Zirconium); John Allegaert (United Color & Pigment); J. F. Daley (Krebs Pigment); and D. W. Robertson (Titanium Pigment Corp.). Government presiding officer: E. H. Bucy, Chief, Protective Coatings Section, Chemicals Branch, WPB.

Vinyl Resins: H. S. Bunn (Carbide & Carbon); L. F. Loutrel (Shawinigan Products); John C. Brooks (Monsanto); A. E. Pitcher (DuPont); J. R. Hoover (Goodrich); Bradley Dewey (Dewey & Almy); W. C. Goggin (Dow Chemical); and Henry B. Townsend (General Latex & Chemical). Government presiding officer: Frank H. Carman, Chief, Plastics and Synthetic Rubber Section, Chemicals Branch, WPB.

An interesting pamphlet devoted to methods of repairing and splicing rubber-jacketed cable is currently being distributed by the Simplex Wire & Cable Co., Cambridge, Mass.

Coming Events

Oct. 23. Buffalo Rubber Group, Hotel Lenox, Buffalo, N. Y.

Oct. 23. Boston Rubber Group, University Club, Boston, Mass.

Oct. 27-29. National Safety Congress, Sherman Hotel, Chicago, Ill.

Nov. 6. Akron Rubber Group, City Club, Akron, Ohio.

Nov. 13. Rubber & Plastics Division, Montreal Section, Society of Chemical Industry, McGill Faculty Club, Montreal, Canada.

Nov. 16-18. American Institute of Chemical Engineers, Annual Meeting, Hotel Netherlands Plaza, Cincinnati, Ohio.

Nov. 24-29. Second National Chemical Exposition, Sherman Hotel, Chicago, Ill.

Nov. 30-Dec. 4. American Society of Mechanical Engineers, Annual Meeting, New York City.

Dec. 16. Rubber & Plastics Division, Montreal Section, Society of Chemical Industry, McGill Faculty Club, Montreal, Canada.

Apr. 12-16. Spring Meeting, A.C.S., Indianapolis, Ind.

Montreal Group Sees Movie

The presentation of the film "Bouncing Molecules," a colored movie which depicts the polymerization of various synthetic rubbers through the use of animated molecular models, prepared by the Esso Laboratories of the Standard Oil Development Co., featured the first meeting of the new season held by the Rubber & Plastics Division, Montreal Section, Society of Chemical Industry, held at the McGill Faculty Club in Montreal on October 9. A question-and-answer period followed the presentation of the movie, the period being both interesting and instructive. Peter Gunter, of the Mack Moulding Co., chairman of the Division, presided at the meeting.

Wax Finish for Rubber Goods

A new and special wax finish developed by S. C. Johnson & Son, Inc., Racine, Wisconsin, manufacturers of the well-known Johnson floor and car waxes, is said to help retard deterioration of rubber by preventing oxidation. The special finish is easy to apply and is both water-repellent and non-flammable. A shop-coating is said to provide a protective, non-porous finish which has a long-lasting lustre. Application of the wax may be made by dipping, spraying or wiping.

NATIONAL SAFETY COUNCIL PLANS ITS 1942 MEETING

Plans are practically completed at this writing for the 31st National Safety Congress and Exposition of the National Safety Council, which will be held in Chicago on October 27-29. Although meetings will be held by various sections in the Sherman, Morrison and LaSalle Hotels, headquarters for the Council will be maintained at the Sherman. As usual, the safety exposition will feature the latest types of equipment for industrial safety.

The Rubber Section of the Council, of which Ralph S. Farnum (U. S. Rubber, Detroit) is chairman and John L. Grider (American Hard Rubber, Butler) is vice-chairman, will meet on Tuesday, October 27, in the Grey Room of the Sherman Hotel. Sessions will be held in both the morning and afternoon, in addition to the sectional luncheon.

At the morning session, Chairman Farnum will open the program by rendering a general report of sectional activities. Paul Van Cleef (Van Cleef Bros.) will then give a paper on "All Out for Safety," which will be followed by a brief symposium on "Shielding the Plant and Personnel Against War Hazards in the Rubber Industry." A motion picture film, "Dropping Incendiaries" will also be shown at this session.

Election of officers for the 1942-43 season will be held during the luncheon, which will be served in the Grey Room, after which awards in the Rubber Section Safety Contest of 1941-42 will be presented. Roland Kastell, assistant to the supervisor of safety of U. S. Rubber, will discuss the outstanding facts behind the contest. An address by a prominent safety executive will also be given.

The session on Tuesday afternoon will be devoted to a symposium on "The Effect of Lengthened Hours on Safety Problems in the Rubber Industry." C. W. Ufford, of Barrington Associates, New York City, will preside during the symposium.

Sets Up Tire Repair Depot

The Air Service Command of the U. S. Army Air Corps has taken over the plant of the former India Tire & Rubber Co. plant, near Akron, Ohio, as a receiving center for airplane tires returned to Akron manufacturers for repair. The air force unit stationed at the plant will sort tires according to the manufacturers and will return them to widespread air commands once they are retreaded and repaired. Use of the former tire manufacturing plant was acquired from the General Tire & Rubber Co. which bought the plant several years ago after extended litigation had balked earlier attempts and after the former India Tire & Rubber Co. had operated in receivership for some time.

Use Bunas in Transportation

According to reports from Germany, as relayed to the American Chemical Society, the various types of synthetic rubbers produced in that country are being used for numerous purposes in connection with transportation. Buna N (Perbunan) gives excellent service for spring suspension and is said to be superior to steel in some respects.

On street cars experiments have been carried out with Buna-suspended wheel sets and Perbunan suspension springs between bogie and chassis. There is a possibility, the report states, that use will be made of synthetic rubber for motor bedding and electric switches. Soft Buna has been employed for torsion suspension in the form of elastic couplings and for torsion vibration absorbers for Diesel engines where these parts are subject to considerable strain.

Buna coatings, either alone or mixed with polyvinyl chloride type resins, have been utilized for various parts of vehicles. It is claimed that these coatings permit the use of ordinary iron for parts which otherwise would have to be made of expensive heat and corrosion-resisting metals. The railway company is said to have introduced Perbunan in place of leather for air-tightening steering valves and brake cylinders.

Resoweld Lining Material

Resoweld, described as a synthetic resin far down the list of critical materials, applicable for lining tanks, pipe, fittings, pumps and similar industrial equipment, has been introduced by the Goodyear Tire & Rubber Co., Akron. It is intended to take the place of natural rubber linings where rubber cannot be used because of war requirements and is available under war regulations in cases where ultimate uses are shown to be of reasonable need. Black in color and closely resembling linings made of natural rubber, Resoweld is thermoplastic, which means that practically the same processes for applying linings of natural rubber can be used. One of the features of the new lining material is its resistance to nitric acid, with the exception of fuming nitric acid, and chromic acid.

New Finishing Material

A new finishing material which is said to provide tack free surfaces for rubber and synthetic rubber products has been introduced under the name of Hevealac by the Glyco Products Co., Brooklyn, N. Y. The new material is a liquid coating product which can be brushed or sprayed on finished rubber articles. In the case of small objects, they can be tumbled in a bath of Hevealac, diluted if desired with denatured alcohol. The new material is said to be fast drying and to leave a clear, transparent, flexible surface of high lustre. It gives a continuous film, resistant to gas to a considerable extent.

PETER P. PINTO CELEBRATES 25 YEARS WITH "RUBBER AGE"

Peter P. ("Pete") Pinto, general manager and treasurer of RUBBER AGE, is celebrating the 25th anniversary of his service with this publication, having joined it in 1917.

Following his graduation from New York University in 1915 with a degree in civil engineering, Mr. Pinto joined the staff of the *India Rubber World*, serving under Henry C. Pearson, founder and then editor of that journal. He left in April, 1916, to enter the planning and efficiency division of the Firestone Tire & Rubber Company at Akron, where he made special investigations and reports of both factory and office departments and engaged in industrial efficiency work.

In August, 1917, Mr. Pinto returned to New York to join the staff of RUBBER AGE, then known as THE RUBBER AGE AND TIRE NEWS, and shortly became its managing editor. In December of that year, however, he was granted a temporary leave of absence to undertake a special assignment with the Rubber Physical Testing Laboratory of the National Bureau of Standards at Washington, D. C.

In February, 1918, after requesting special duty, Mr. Pinto entered the Aviation Service of the Army and was assigned to the Radio Division in line with his training as an engineer. He saw active service in France and was mustered out in February, 1919, as a second lieutenant, rejoining RUBBER AGE immediately.

In 1921, Mr. Pinto accepted a position with the Portage Rubber Company in Barberton, Ohio, but remained with that organization for only a few months since the post-war depression forced the company to liquidate. He had accepted another position in the tire design department of the Goodyear Tire & Rubber Company, but before actually starting with that company he received a call to return to RUBBER AGE. He has been with that publication since.

Besides his continued writing for RUBBER AGE, Mr. Pinto has written a number of general and technical articles on rubber for other publications, including "The Story of Rubber," which was published in August, 1920, in *The Mentor*, a magazine which was devoted to developing popular interest in the arts and sciences. In July, 1925, he gave one of the first radio talks on rubber ever to be broadcast. He spoke on WJZ in New York and outlined the workings of the Stevenson Restriction Scheme and its relation to rubber production and prices.

Photo, Shelburne Studios

Peter P. Pinto

"Pete" Pinto, as he is known in the trade, has a host of friends in the rubber factories and among the suppliers to the industry. He is active in both the New York Rubber Group and the parent Division of Rubber Chemistry of the A.C.S., being one of the founders of the New York Group which was organized in 1928. He has acted as its secretary-treasurer six times in the past ten years and has been a member of the executive committee since 1931.

The steady growth of RUBBER AGE and its recognition today as one of the world's outstanding rubber journals is due in large measure to the untiring efforts of Mr. Pinto, whose hand has guided the publication through more than two decades of what is undoubtedly the most progressive period in the history of the rubber industry.

A quarter of a century of service with a single organization is a noteworthy accomplishment for any individual and I am sure that the hundreds of friends Mr. Pinto has made in the rubber and allied fields in the past twenty-five years join this writer and the staff of RUBBER AGE in extending to him sincere congratulations and the very best of wishes for the future.

P. L. PALMERTON,
President,
Palmerton Publishing Co., Inc.

McGill Offers Extension Course

The Department of Chemistry of McGill University, Montreal, Canada, will again offer this Fall for the fifth consecutive year an extension course on the chemistry and technology of resins and elastomers. This evening course of lectures will begin about the middle of this month and will continue for sixteen weekly lectures. It will cover the theoretical chemistry and practical technology of synthetic plastics, coating resins, textiles and rubbers. The instructor will be Dr. R. V. V. Nicholls, assistant professor of chemistry at the university, who is also secretary of the Rubber & Plastics Division, Montreal Section, Society of Chemical Industry. Further details can be secured from Dr. Nicholls.

Akron Meets on November 6

The Fall Meeting of the Akron Group, Rubber Division, A.C.S., will be held at the Akron City Club on November 6. Guest speaker for the evening will be Lt. Waynett Kuhn of the Army Ordnance Plant at Ravenna, Ohio. His subject will be "Shell Loading" and various activities at the Ravenna Arsenal will be demonstrated by the use of exhibits. A film depicting the manufacture of 3-inch anti-aircraft shells will also be shown. Novel entertainment is planned to complete the program.

Cabot Completes Isobutane Unit

Godfrey L. Cabot, Inc., Boston, Mass., has announced the completion of a separation unit for the manufacture of isobutane at one of its Texas plants. Another unit is expected to be completed shortly at one of the company's other plants in Texas.

A cleverly-planned, illustrated manual for new employees, designed to acquaint them with the company, its products, its personnel, and its handling of labor, has been issued by Manning, Maxwell & Moore, Inc., Bridgeport, Conn. Cartoon-style illustrations make the booklet more palatable to the average worker.

Included among factories recently awarded the Army-Navy "E" Production Award were two Firestone plants and one Goodyear plant. Three plants of the Monsanto Chemical Co. have also received the coveted award.

An entirely new type of auxiliary gasoline tank, which is carried outside bombers and fighter planes, giving them much greater range, has been developed and is in mass production by U. S. Rubber. Streamlined in shape, the new tank is so designed that the pilot may drop it after using its fuel supply or upon entering combat, thus removing any impediment to his ship's maneuverability.

Boon to Bugs

The rubber shortage is a boon to bugs. According to a recent patent issued to Charles W. Murray, a research worker of the Department of Agriculture, powdered rubber can be utilized in the fight against insects. Nicotine, it has been discovered, can be effective as an insecticide for 20 days when sprayed on plants, providing the nicotine is applied in an emulsion containing powdered rubber. This emulsion gives off deadly nicotine vapors that kill the insects. Any kind of old or new rubber is effective. It is ground into a powder and mixed with nicotine and a small amount of oil. The resulting mixture is then sprayed on the plants.

Montreal Meets November 13

The next meeting of the Rubber & Plastics Division, Montreal Section, Society of Chemical Industry, will be held on November 13 at the McGill Faculty Club in Montreal, Canada. A. E. Byrne, manager of the plastics division of the Canadian General Electric Co., will deliver a general talk on "Plastics." As usual, dinner will be served at 6:30 P.M.

Chemical Publishing Co., Inc., 236 King St., Brooklyn, N. Y., has issued a new edition of its book catalog, "Technical Books on All Subjects." Copies are free on request.

Goodyear Tire & Rubber Co. will shortly go into production of lining for the battery rooms of submarines. The lining will be produced on equipment which heretofore has been used in the production of Plioweld, an interior surface for storage tanks and similar items. On submarines, the walls and floors of the battery room are lined with rubber or composition sheeting to protect the steel walls from corrosion by escaping battery fluid and fumes.

Every rubber manufacturer should have a copy of the booklet, "Scrap, and How to Collect It," recently issued by the American Industries Salvage Committee, 350 Fifth Ave., New York City. The booklet covers practically all types of scrap essential to the war effort.

One of the largest belts ever produced by the Goodyear Tire & Rubber Co. was recently shipped to the Peerless Cement Corp. in Detroit. The belt was 1,240 feet long, 54 inches wide, and weighed 24,300 pounds. It will move approximately 657,000 tons of stone and 175,000 tons of coal annually from boats docking near the company's storage yards.

Data on Rubber-Bearing Plants

A bibliography on rubber-producing plants other than guayule and rubber trees, in the form of a list of references useful to investigators, has been issued as a Library Bulletin (No. 12) by the Colorado State College Library. It was prepared by Morris E. Paddick, assistant botanist, Colorado Agricultural Experiment Station, Fort Collins, Colorado. The bulletin is divided into eight sections, as follows: General, Mexico and the United States, Russia, Central and South America, Far East, Madagascar, Africa, and Europe (except Russia).

Buffalo Group to Meet

The first meeting of the Fall Season of the Buffalo Group, Rubber Division, A.C.S., will be held at the Hotel Lenox in Buffalo, N. Y., on Friday, October 23. F. F. Lucas, of the Bell Telephone Laboratories, will show a motion picture film on latex. He will also add a few contributory remarks to the film.

Close Croydon Branch Office

The British Rubber Publicity Association has announced that it has closed down its branch office in Croydon, Surrey, and that in the future all inquiries for literature, films, etc., should be addressed to the general offices at 19 Fenchurch St., London, E.C. 3, England.

An interesting celluloid novelty, with a 1942-43 calendar on one side and a warning message on the other, reading "If you see a person tampering with this car or tires call police, owner is absent," is being distributed by the Carter Bell Mfg. Co., Springfield, N. J., manufacturers of vulcanized vegetable oils.

The "Civilian Defense Index," a little booklet containing information on air raid precautions, blackouts, bombs, gas protection and household precautions, as well as first aid data, is currently being distributed by General Atlas Carbon, 60 Wall St., New York City.

A booklet on the conservation of critical materials used in the manufacture of wires and cables, including rubber, has been issued by the Simplex Wire & Cable Co., Cambridge, Mass. Other materials covered include copper, tin, lead, steel and jute.

Replicas of the blood system of the human kidney, revealing tiny details which are not visible in the regular anatomical cross section, are now being made with synthetic rubber latex. The latex is injected into the blood vessels and after the rubber has set the human tissue is dissolved with acid. Red and blue colors are used to distinguish arteries and veins.

H. E. SMITH NAMED PRESIDENT OF UNITED STATES RUBBER CO.

Herbert E. Smith was elected president of the United States Rubber Co. on September 28, according to an announcement by F. B. Davis, Jr., chairman of the board and chief executive

H. E. Smith

officer of the company. Mr. Smith has also been elected chairman of the executive committee and a member of the finance committee.

Mr. Smith's promotion, which will enable him to share with Mr. Davis more of the growing load on management, was prompted by the company's rapidly expanding activities, including operation of eight new munitions plants for the government, in addition to more than a dozen plants of its own in war production from coast to coast.

Starting with the company 29 years ago, Mr. Smith had worked his way up to a vice-president, vice-chairman of the executive committee, and a director of the company. Born in San Jose, Calif., in 1889, he attended local grammar school, Washburn Prep School, and the University of California, from which he was graduated in 1911. After a couple of years in the field with a mine construction company he went to work with U. S. Rubber selling mechanical rubber goods to marine accounts along the San Francisco waterfront.

In 1918 Mr. Smith came to New York as assistant western sales manager, and later in the same year became manager of the New York branch. In 1924 he became general manager of the export subsidiary, and the following year was made general manager of the company's general division which included all products except tires. In 1926 he became a second vice-president. In 1929 he was elected a vice-president, director, and member of the company's executive committee. In January this year he was elected vice-chairman of the executive committee.

Mr. Smith is a director of the Rubber Manufacturers Association, a trustee of the Brooklyn Trust Company, and a member of the Metropolitan and New York Athletic Clubs.

Harry E. Humphreys, Jr., was also elected vice-chairman of the executive committee; and Bernard W. Doyle and Lammot du Pont Copeland were elected to the finance committee. In addition to his new duties, Mr. Humphreys serves as chairman of the finance committee and as a director. Both Mr. Doyle and Mr. Copeland are also directors.

Boston To Hear Parrish

W. D. Parrish, of the Hycar Chemical Co., Akron, Ohio, will be the principal speaker at the next meeting of the Boston Group, Rubber Division, A.C.S., which will be held on Friday, October 23, at the University Club in Boston, Mass. Mr. Parrish will discuss the compounding of Hycar OR and OS and will exhibit various products made of synthetic rubber. Products utilizing synthetic rubber cements will also be shown.

FINANCIAL NEWS

Faultless Rubber Co.

Year ended June 30: Net profit of $130,367, equal to $1.99 each on 65,450 shares, which compares with $128,411, or $1.96 a share, reported for the preceding fiscal year. Profit before tax allowance amounted to $359,866, an increase of $161,130 over the 1941 result. Allowance for Federal taxes was $229,500, an increase of $160,500 over the previous year. Net current assets as of June 30, 1942, totalled $739,481, equal to $11.30 a share, and represented a drop of $18,937 from the previous year.

National Rubber Machinery Co.

First Half: Net income of $93,656 after provision of $468,000 for Federal taxes, equal to 61c each on 154,000 shares, which compares with $158,849, or $1.03 a share, reported for last year after $85,000 taxes. Net sales amounted to $2,272,263 and $1,377,078, respectively.

Dewey & Almy Chemical Co.

First Half: Consolidated net profit of $255,170, equal to 86c each on 295,317 shares of common stock, which compares with $342,835, or $1.34 each on 217,397 shares, in the 1941 period.

Baldwin Rubber Company

Year ended June 30: Net profit of $316,040, equal to $1.00 each on 315,254 shares of $1-par stock, which compares with $611,711, or $1.94 a share, reported for the previous year.

LOS ANGELES GROUP HOLDS FIRST MEETING OF SEASON

The first of its series of monthly supper meetings in the new season was held by the Los Angeles Group, Rubber Division, A.C.S., at the Mayfair Hotel in Los Angeles on October 6. Approximately 150 members and guests were in attendance.

The program included the presentation of the picture "Robots and Rubber," through the courtesy of the Farrel-Birmingham Co., Inc., represented on the coast by H. F. Parkerton, Sr. Although this picture, which features "the mill room of the future," has previously been shown before various local rubber groups this was the first time it was presented with sound accompaniment. The voice was that of Andrew Hale, manager of the Akron office for Farrel-Birmingham, who supervised the filming of the picture, actually photographed by Jack Von der Heide.

Also shown were moving pictures in color taken at the two-day "outing" of the group at the Uplifters' Club in Los Angeles during the summer. "Harm" Jordan took the pictures, which evoked a good deal of amusement. Harold G. Ghalfant, who has spent several years among the aborigines of South America as well as those of Southern Mexico and Central America, gave an educational lecture on his experiences and showed moving pictures of the natives.

During the business session, Phil Drew and George Steinbach were named editor and manager, respectively, of the group's forthcoming Year Book. The committee in charge of the book reported that the 1943 edition will be larger than the last one which was the initial book distributed. The RUBBER RED BOOK, the Directory of the Rubber Industry published by RUBBER AGE, will again be used as the basis of the directory section of the Year Book, it was announced. The RUBBER AGE was also highly complimented for the write-up and pictorial layout given to the summer "outing" of the group.

A plan to hold a theatre party was overwhelmingly approved. The plan provides for the disposal of 350 tickets to the famous play "The Drunkard," currently playing at one of the Los Angeles theatres. Special attention was called to new name-plates, with large-sized type, which are now ready for new members. The enlarged printing, it was pointed out, aids in the quick identification of culprit members. Several new members were voted in, with T. Kirk Hill providing the major embarrassments of the initiations.

Ed Royal, of H. M. Royal, Inc., distributed decks of cards as table favors. The Oliver Tire & Rubber Co., through E. A. Richards, representative, offered a $25.00 war bond in the form of stamps as a door prize, this prize going to W. B. Brady. A $5.00 book of stamps and a $3.75 book given by the group itself, were awarded as prizes, as was a badminton set.

LOS ANGELES NEWS

The Golden State Rubber Mills is reported to be busily engaged in filling war contracts and a new mill has been installed to keep up with the demand. Emmett Long, general manager, states that synthetic rubber is being used for the most part.

Frank L. Shew, who has been associated with various local rubber manufacturing companies in the past, has joined the development department of the Firestone Tire & Rubber Co.

Carl E. Stentz, now associated with Avery Adhesives, 453 East 3rd Street, has returned from a trip to the East made in the interests of that company. His father is now in complete charge of the Latex Seamless Products Co.

George Miller, who has been chief chemist of the Sierra Rubber Company for some time, is now connected with the Guayule Rubber Emergency Project at Salinas, Calif.

Fred Woerner of the L. A. Standard Rubber Co. and Ray B. Stringfield, now connected with Vultee Aircraft, were among those attending the recent meeting of the S. A. E. in Denver. The meeting dealt with frame material construction.

Monroe Beyer, well known rubber chemist of Los Angeles, who went to Sandusky, Ohio, almost a year ago to work for the Trojan Powder Co., has returned to this area and is now a chemical engineer at Firestone. Mr. Beyer developed pneumonia in the East and found the "unusual" California climate necessary for rapid recovery.

H. F. Parkerson, Sr., local manager for Farrel-Birmingham Co., Inc., recently returned from a trip which carried him to the company's plants in the East.

"Monty" Montgomery, local manager for Martin, Hoyt and Milne, will not be stumped for means of transportation when the old car has to be jacked up for the duration. He has purchased a bicycle and will cover his territory in that manner if needs be, he states.

J. S. Collbran, Jr., who has been with A. I. Lynch & Co. for many years, is now a lieutenant in the Chemical Warfare Service of the Army.

Bettis Rubber Co., 1557 So. Esparanda Street, has added a new grinder for the manufacture of abrasive wheels.

Mrs. Charles Lamb, Sr., ill for many months, is now home from the hospital and is reported to be recovering nicely. Mr. Lamb is vice-president and general manager of the West American Rubber Co.

T. Kirk Hill, president of the Kirkhill Rubber Co., surpassed his own expectations in the number of prairie chickens bagged in North Dakota and Saskatchewan during his recent hunting trip.

Featheredge Assets Auctioned

The complete assets of the Featheredge Rubber Co., 340 West Huron St., Chicago, Ill., including machinery and equipment, were scheduled to be sold at public auction on October 7. Michael Tauber & Co., 411 South Market St., Chicago, was the auctioneer. The machinery and equipment offered included mills, refiners, calenders, Banburys, scales, compressors, conveyors and blowers of various kinds. Featheredge Rubber was organized in 1911 and for many years has been engaged in the production of sponge rubber goods.

CANADIAN NEWS

In order to devote more time to one of the most important jobs in Canada's war program, R. C. Berkinshaw has relinquished the posts of chairman of the Wartime Industries Control Board and Assistant Deputy Minister of the Department of Munitions and Supply. He now becomes President and Treasurer of the Polymer Corporation, Ltd., the crown corporation responsible for Canada's entire synthetic rubber program.

Mr. Berkinshaw, who is treasurer and general manager of the Goodyear Tire and Rubber Co. of Canada, Ltd., now faces the task of completing and getting into operation by the middle of next summer the largest single project ever undertaken at one place in Canada. Total expenditure for the synthetic plant at Sarnia, Ontario, which will have an annual capacity of over 40,000 tons of Buna S and Butyl Rubber, will be close to $60,000,000 and 5,000 men are to be employed in its construction.

The former president of the Polymer Corporation, Col. Arthur Bishop, has been named chairman of the board, and H. R. Smyth, comptroller, has been made assistant treasurer. J. R. Nicholson will continue as general manager and secretary.

Mr. Berkinshaw's post as chairman of the W.I.C.B. has been taken by Henry Borden, general counsel of the department since it was first organized in April, 1940.

Mr. Jack Moriarity, of Canadian Fabrikoid, is taking the place of George A. Lee as special adviser to A. H. Williamson, Controller of Supplies, in connection with synthetic rubber problems. Mr. Lee has been on loan to the government from C.I.L. and is returning to his duties in Montreal as assistant sales manager of the organic chemicals division.

Requests from Canadian rubber manufacturers for allocations of the various synthetic rubbers will continue to flow through Mr. Moriarity's office in Ottawa rather than being sent directly to the War Production Board in Washington.

Paul D. Scott, formerly a member of the technical staff of the B. F. Goodrich Co., Ltd., and more recently with Welland Chemicals, has joined the Dow Chemical Company, Ltd. After a six to eight month training period in the Dow plant at Midland, Michigan, Mr. Scott and several other Canadian chemists will take charge of styrene production at the Sarnia synthetic rubber development.

Metallic Chemicals of Canada, Ltd., has recently been incorporated at Galt, Ontario, to manufacture a British cellulose acetate base plastic called "Permanoid." The product is said to be useful as a textile and rubber substitute.

Annual presentation of twenty year service awards was recently made by the Miner Rubber Company, Ltd., at the head office in Granby. Twenty-five employees received gold watches and checks for $500 from Mrs. W. H. Miner and J. W. H. Miner. Long service certificates were presented by W. H. Miner, president of the company, who thanked each of the recipients for their many years of loyal service. A total of one hundred and ninety-three employees, or nearly twenty-five per cent of the entire force, have now received these awards.

Thomas G. Kennedy, vice-president and general manager of the Northern Rubber Company, Ltd., Guelph, Ontario, since it was organized more than twenty years ago, died recently at the age of 58. Mr. Kennedy, a native of Guelph, was also a director of Federal Wire and Cable Company, Ltd., and of Wyndham Plantations.

The largest cast steel tire mold ever made was recently completed in the plant of the Atlantic Foundry Co., Akron. It is intended for eventual use in one of the Akron tire factories. The company has also made the largest cast iron tire mold ever produced.

NAMES IN THE NEWS

W. E. FOUSE, vice-president and secretary of the General Tire & Rubber Co., Akron, recently received the highest honor in Masonry when he was nominated by the Grand Lodge to become a 33rd Degree Mason. He has been active in Masonry since 1910 and was instrumental in founding the Tadmor Shrine in 1923.

CHARLES C. CHAMBERLAIN, who joined Jenkins Brothers, Bridgeport, Conn., in 1929 and who has acted as advertising manager and publicity director in recent years, has been named general sales manager of the company. He will make his headquarters in the New York offices.

C. E. CARLSON was recently appointed director of laboratory research for the Pennsylvania Rubber Co., Jeannette, Penna. The announcement was made by H. W. JORDAN, president.

FRED C. TANNER, vice-president and formerly manager of engineering sales for the Federal Products Corp., Providence, R. I., has been advanced to the position of general manager of the company. In the past he has been associated with both Western Electric and General Electric.

GRANT W. SMITH, assistant professor of chemistry at the University of Kansas, where he taught for the past seven years, has joined the research staff of the B. F. Goodrich Co. at Akron where he will work on polymerization problems in the Koroseal Division.

FREDERICK W. SULLIVAN, JR., manager of chemical research, Barrett Division of Allied Chemical & Dye Corp., since 1940, has been appointed technical director of the Institute of Gas Technology. The Institute maintains headquarters in Chicago.

E. W. PETERSON, assistant to the president and sales manager of Stowe-Woodward, Inc., Newton Upper Falls, Mass., has been elected president of that company, succeeding the late SHERMAN B. WARD. He has been associated with the company for many years, also having served as vice-president.

DONALD NOBLE, secretary of the Wooster Rubber Co., Wooster, Ohio, has been named instructor in business administration at Heidelberg College. He is a graduate of Western Reserve University and was associated with the National City Bank of Cleveland before joining the rubber company about two years ago.

RALPH B. HOWARD, assistant treasurer of Goodyear Foreign Operations, Inc., since October, 1939, and associated with the parent company for almost 27 years, has been named assistant treasurer of the Goodyear Aircraft Corp. He will be stationed at the new plant in Arizona.

W. EDWIN PALMER, secretary and assistant treasurer of the Seiberling Rubber Co., Akron, was recently elected president of the board of trustees of the Ohio Masonic Home at Springfield, Ohio.

L. H. CHENOWETH, manager of manufacturers' sales for the B. F. Goodrich Co., who has been connected with the Rubber Branch of WPB for the past several months, has resumed his duties with the company in Akron.

JOHN K. WHEELER, treasurer of the Victor Products Corp., Hagerstown, Maryland, and Gettysburg, Penna., has been elected to active membership in the Controllers Institute of America.

JACK "DOC" MISCALL, for many years sales engineer for the Flintkote Co., has joined the Essex Rubber Co., Trenton, N. J., where he is acting as director of development.

IN THE SERVICE

B. A. GAMMEL, JR., associated with the Polson Rubber Co., Garrettsville, Ohio, for the past five years, first as credit manager and later as assistant sales manager, has been commissioned a Junior Grade Lieutenant in the Navy and is already on active duty.

GEORGE E. FOUCH, connected with the sales research department of Goodyear from 1937 to April, 1942, when he was transferred to the Goodyear Aircraft Corp., has been commissioned a Senior Grade Lieutenant and is now associated with the Production Engineering Section, Bureau of Aeronautics, Navy Department, Washington, D. C.

DAVID SCOTT, JR., of the Henry L. Scott Co., Providence, R. I., who recently joined the Navy as a Junior Grade Lieutenant, is now associated with the Bureau of Ships at Washington, D. C.

H. B. MORRIS, who formerly represented Naugatuck Chemical and Dispersions Process, Inc., in the New England territory, is now a First Lieutenant in the Chemical Warfare Service and is associated with the Procurement Division at the New York offices.

Billings Missing in Action

Lieutenant Commander Edmund Billings, vice-president of Godfrey L. Cabot, Inc., Boston, Mass., has been reported missing in action by the Navy Department. Mr. Billings was born in Boston on September 9, 1897, attended Roxbury Latin School and was graduated from Harvard University in 1919. During the first World War he served in the Chemical Warfare Department. In 1923 he joined Cabot as sales manager and was elected to the board of directors in 1930. He was made a vice-president in 1934. Mr. Billings married Elise Garceau in 1920. They have four children, one daughter and three sons.

To Make Civilian Gas Masks

Goodyear Tire & Rubber Co. will shortly begin the manufacture of gas masks for civilians at its Ohio and Alabama plants. The masks will be assembled at both plants with components supplied by the Army. After receiving the completed masks, the Army is expected to turn them over to civilian defense agencies. The civilian masks differ mainly from soldiers' masks in being lighter. Reclaim rubber alone will go into their manufacture. In addition to being assembled by Goodyear, the masks will be packed in special over-the-shoulder and other types of carriers which Goodyear manufactures without rubber in any form.

Tyer Awarded Army-Navy "E"

The coveted Army-Navy "E" for high achievement in production was awarded to the Tyer Rubber Co., Andover, Mass., at appropriate services held on September 22. The presentation of the "E" pennant and pins for all employees was made by Col. J. S. Seybold, chief of the Procurement Section, Supply Division, Office of Chief of Engineers, and Lt. Com. C. C. Pyne of the Navy. W. E. Brimer, treasurer and general manager of Tyer Rubber, accepted the award for the company.

OBITUARIES

E. O. Malmquist

E. O. Malmquist, one of the most popular members of the technical service staff of the Goodyear Tire & Rubber Co., died in the Sibley Memorial Hospital at Washington, D. C., on September 27, following an emergency appendicitis operation. He had arrived in the Capital only a few days earlier to join the Rubber Conservation Committee of the Army and Navy Munitions Board on "loan" from Goodyear. He was 38 years of age.

Associated with Goodyear since 1928, shortly after being graduated from the Massachusetts Institute of Technology, Mr. Malmquist led a somewhat adventurous life. Sent to California in 1931 he was married the night of the famous Long Beach earthquake. Transferred to the company's Swedish plant at Norrkoping, near Stockholm, in 1940, he sent his wife and two children back to America via Genoa when the war broke out and their ship sailed the day Italy declared war.

When he returned to this country from Sweden, Mr. Malmquist came via Russia, China and the Philippines. Sent on a special mission to Libya to study field operations for the government, he arrived just as Rommel's forces broke through. Shortly after his return to America he was assigned to the Army and Navy Munitions Board.

Mr. Malmquist was born in New York City of Swedish parentage. His widow and two sons survive.

Stanley W. Harris

Stanley W. Harris, president of the McNeil Machine & Engineering Co., of Akron, Ohio, died suddenly at his farm near Akron on October 11. He suffered a heart attack while enjoying his favorite recreation, fishing with friends. He was 65 years of age.

Mr. Harris died on the farm where he was born. As a youth he first worked near Akron and then traveled and worked throughout the country as far west as California. He returned to Akron and in 1909 founded the Akron Rubber Mold & Machine Co. This company perfected and patented some of the earliest pneumatic tire molds.

Although Mr. Harris had other interests, most of his business career was spent in the rubber and auto equipment field. In 1928 his mold company and a group of others merged to form the National Rubber Machinery Co. He acted as president of the new company until he resigned in 1934. Later, he and some friends formed S. W. Harris, Inc., to handle sales for the Summit Mold & Machine Co., and still later he took over the McNeil concern.

Outside of the business field, Mr. Harris was best known for his activities on the Ohio Boxing and Wrestling Commission, on which he served for 12 years, being chairman for most of that period. He was a 32nd degree Mason, a past president of the Akron City Club, and a member of the Portage Country Club. A widow survives.

Carl N. Hand

Carl Nelson Hand, chemical engineer and retired plant manager of the Rubber Service Department of Monsanto Chemical Co., died at Charleston, West Virginia, on September 18 while en route from Ohio to his home in Miami, Florida. He was 50 years of age.

Mr. Hand, together with E. J. Smail, Jr., and C. O. North, founded the Rubber Service Laboratories at Akron in 1922 and acted as president and general manager of that organization until it became part of Monsanto in 1929. He continued as manager of the Rubber Service Department plant at Nitro, West Virginia, until his retirement in 1938, engaging in private research work since that time.

Mr. Hand was a graduate of Hobart College and held a chemical engineering degree from the Massachusetts Institute of Technology. Prior to founding the Rubber Service Laboratories he was associated with the Goodyear Tire & Rubber Co. as a development engineer. A widow survives.

Lester O. Hills

Lester O. Hills, associated with the Goodyear Tire & Rubber Co. as an engineer for the past 26 years, died on September 17 at the age of 47 following a heart attack suffered at his home. A native of Akron, Mr. Hills was the son of one of Goodyear's "Old Guard," a group of persons who were employed by the company at the turn of the century. He was a member of the Goodyear 25-year club and Masonic Lodge 666, F. and A.M. He was active in civic and church affairs and was a member of the East Akron Board of Trade. A widow, two daughters and a son survive.

Letha C. Pretty

Letha C. Pretty, wife of George E. Pretty, president of the Pretty-Scheffer Co., Coshocton, Ohio, died at her home in Coshocton on September 7 at the age of 56. She had been seriously ill for several months and death was attributed to complications. Mrs. Pretty was born at Carrollton, Ohio, in 1886 and was married to Mr. Pretty in 1907. Funeral services were held on September 9 with interment in West Lawn Cemetery, Carrollton.

Clinton E. Hooven

Clinton E. Hooven, vice-president, secretary and a director of the Dayton Rubber Mfg. Co., Dayton, Ohio, was found dead in his apartment in the Hotel Vanderbilt in New York City on September 26. Death was due to a sudden stroke. He was 72 years of age.

Mr. Hooven founded the Dayton Rubber Mfg. Co. with John A. MacMillan in 1908. He had been actively connected with the company ever since its organization and was the oldest member of the Dayton Rubber Service Club. In addition, he was also vice-president of the General Machine Co., Hamilton, Ohio, which was founded by his father, and president of the Hooven Automatic Typewriter Co.

Mr. Hooven took especial pride in the rubber company he helped to found which was shown by his everlasting attention to all the details pertaining to its best interests. He had a well-earned reputation for being courteous, frank, fair and honest in his opinions. A daughter survives.

Edward H. Thomas

Edward H. Thomas, manager of the New York office of the Farrel-Birmingham Co., Ansonia, Conn., died at the Presbyterian Hospital in Pittsburgh on September 13 following a heart attack suffered a few days earlier. He was 56 years of age. Mr. Thomas was born in New York City, received his early education in the public schools of New Jersey and graduated from Stevens Institute of Technology with an M.E. degree. He was engaged in the sugar industry for the most part until he joined Farrel-Birmingham in March, 1926, as sales engineer and manager of the New York office. He was widely known in both the cane sugar and marine industries. A widow and a daughter survive.

Turco Products, Inc., 6135 South Central Avenue, Los Angeles, has developed a radically different cement floor cleaner for garages and other buildings where tires are subject to the deteriorating action of oils and greases. The new cleaner is called Turco Aktiv.

"Plain Facts on Wartime Care of Rubber V-Belts" is the title of a booklet issued by the Texrope Division, Allis-Chalmers Mfg. Co., Milwaukee, Wisconsin. Replete with illustrations, the booklet applies to all makes of V-belts.

Lustreflex is the name of a new stretchable shoe fabric introduced by the Bristol Fabrics Co., Boston, Mass. The new fabric does not employ the use of any critical materials and its application is said to be the same as that of rubber yarn materials.

New Rubberized Uniform

A new rubberized double texture uniform has been designed by the Quartermaster Corps for the Army. The new uniform, pictured here, is intended for

use in some northeastern and northwestern stations in the rainy season. It is worn as an outer suit over the uniform and is made of two plies of fabric, cemented and coated with rubber compound. The overshoes are of the all-rubber Arctic type. The gloves are rubberized canton flannel work gloves. Photo by U. S. Signal Corps.

Acquires Interest in Rubber Firm

Negotiations have been concluded whereby the Revertex Corporation of America has acquired a substantial interest in the Rubber Corporation of America. Revertex, which has its plant and laboratories in Long Island City, is well known as a distributor of latex and latex concentrates, and is currently acting as a distributor of these materials for the Rubber Reserve Co. The Rubber Corporation of America, organized about two years ago, operates a plant in Brooklyn, N. Y., but maintains headquarters in New York City. Principal officers of the Rubber Corporation now include Waldemar Kops, president; Solomon Z. Melup, vice-president; William A. Merton, vice-president; and Alfred Merton, treasurer. William A. Merton is president of the Revertex Corporation of America.

Develop Transparent Plastic

The development of an entirely new transparent plastic having many times the abrasion resistance of other clear plastics has been announced by the Columbia Chemical Division of the Pittsburgh Plate Glass Co. The new plastic, called C.R. 39, does not dissolve in acetone, benzene, toluene, alcohol, gasoline, or any of the common solvents. Its resistance to abrasion is 10 to 30 times greater than other clear plastics. It retains its shape even when exposed to high atmospheric temperatures and can be formed into large sheets, either clear or laminated, by the application of extremely low pressures. Since C.R. 39 is thermosetting and releases no gaseous or liquid by-products when curing, it is said to open up a broad new field of plastic applications not satisfied by any other resin.

New Carbon Black Method

A new method of manufacturing carbon black by means of an "exploding gas" has been developed at the University of Kansas, Lawrence, Kansas, by Dr. George W. Stratton, professor of chemistry, and Delos E. Winkler, now a research chemist for the Shell Petroleum Co. at Emeryville, California. The new method is said to obtain 30 pounds of carbon black from 1,000 cubic feet of gas as compared with present methods of recovering only 2 to 2½ pounds from the same amount of gas. The "exploding gas" is said to be a mixture of natural gas and chlorine, an electric spark or a hot filament causing the "explosion" without the presence of oxygen. The mixture is set off in sealed chambers, free of oxygen, arranged so that the carbon cloud settles in a collecting basin.

Rubber Union Holds Meeting

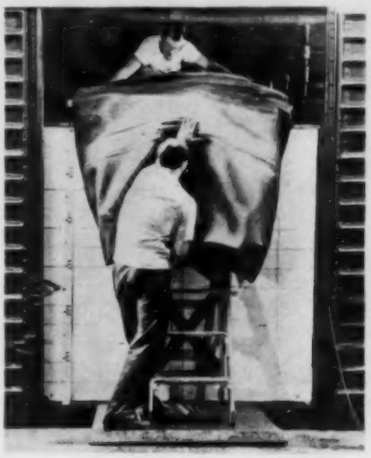
The United Rubber Workers of America, C.I.O. affiliate, held a three-day convention in Akron, Ohio, from September 24 to 26. Sherman H. Dalrymple was re-elected president for the eighth time and L. S. Buckmaster was re-elected vice-president for a second term. Charles E. Lanning, a member of the Ohio Rubber Co. local, was elected general secretary-treasurer to succeed Frank Grillo who recently entered the Army. The convention served notice on all locals to fulfill the union's no-strike pledge, demanded government control of the synthetic rubber industry, and asked for increased participation of labor in the synthetic rubber program. A number of other resolutions were approved.

Abstract Service Developing

The eighth issue of the abstract service on Resins-Rubbers-Plastics, published by the Interscience Publishers, Inc., 215 Fourth Ave., New York City, has been issued. Like the previous issues, the abstracts are carefully divided into prearranged subjects and are complete to reproductions of graphs, charts, etc. The current issue includes a number of abstracts from German journals which the editors were able to secure for subscribers. Professor H. Mark and E. S. Proskauer are the editors of the special service.

Mareng Oil Tanks Tested

Considerable testing of synthetic rubber oil tanks for possible use this winter is currently being conducted. These tanks, made with Thiokol by the U. S.



Rubber Co., are known as Mareng cells and are manufactured under patents held by the Glenn L. Martin Co. They turn railroad box and gondola cars into tank cars. In the accompanying illustration, workmen are pushing one of the Mareng cells through the doorway of an especially fitted freight car. The use of the cells may solve the critical problem of oil transportation.

Show Will Feature Salvage

Through the participation of the Industrial Salvage Section of WPB's Conservation Division, the National Chemical Exposition to be held at the Sherman Hotel in Chicago from November 24 to 29 will feature an educational exhibit stressing the campaign to salvage approximately 100,000 pounds of essential chemicals. The exhibit will be designed to speed up the reclamation program by acquainting all users of solvents with the urgency of putting an end to waste in their plants. Total exhibit space at the exposition, sponsored by the Chicago Section of the American Chemical Society, has already been assigned to more than 100 firms in the chemical and allied industries. Another special feature will be an exhibit of micrographs contributed by 40 laboratories now using the Electron Microscope.

Battery Manufacturers to Meet

The regular annual convention of the Association of American Battery Manufacturers, Inc., of which V. L. Smithers, of Akron, Ohio, is Commissioner, will be held on October 22 and 23 at the Palmer House in Chicago. In addition to governmental orders regulating production, considerable time will be devoted to a consideration of new standards and price regulating measures.

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G-11 is considered by many as the most effective antiseptic ever used in either latex or compounded rubber goods. For example, it is four times as strong as thymol in bacterial power against Staphylococcus Aureus. And this exceptional germicidal action is long-lived because G-11 is insoluble in water and is non-volatile. G-11 is also odorless, non-toxic in rubber and cannot harm the user. It is inexpensive to use, too—0.5% by weight is generally sufficient.

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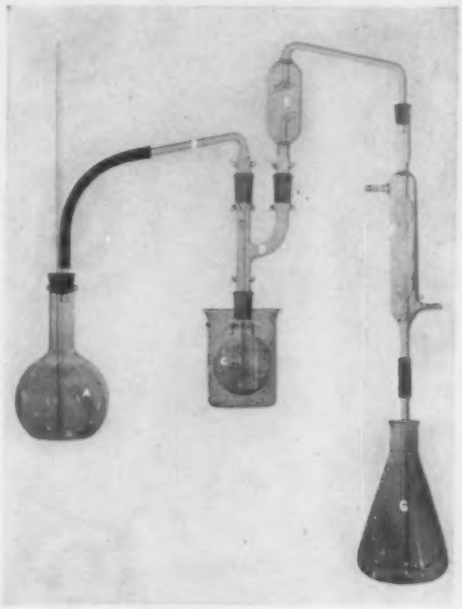
NEW EQUIPMENT

Determination of Rubber Hydrocarbon

An apparatus for the direct determination of rubber hydrocarbon has been developed and introduced by the Macalaster Bicknell Co., 412 Temple St., New Haven, Conn. The apparatus used is illustrated herewith. In its present form, the testing procedure has not been extended to many types of rubber compounds, but



insofar as it has been used it has been determined that it is applicable to crude rubber, vulcanized rubber including reclaim, and balata. Results achieved with the apparatus may be expected to be accurate within 2% based on the weight of the sample, according to the manufacturers. Results are said to be usually consistent to 0.5% or less, based on the weight of the sample, depending on the particular type of rubber under test.

New Heavy-Duty Crane Truck

A new heavy-duty, 10 000-pound capacity crane truck, known as the Type CXF, designed to handle the heavier unit loads occasioned by the war production program, has been introduced by the Baker Industrial Truck Division of the Baker-Raulang Co., Cleveland, Ohio. The efficient operation of this crane is due in part to the reduction of dead weight made possible by this company's exclusive design. The hoist units are positioned so that they are available as counterweight, resulting in lower gross weight in spite of heavier construction throughout. Safety of operation is assured because the bridging over the top of the battery compartment is closely spaced so that the operator may look easily along either side.

The mast on which the superstructure slews is a tall member giving two widely separated points of

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Charleston, West Virginia

bearing which results in low bearing loads. This mast height permits a higher position for the topping cable idler sheave than is possible with other designs. This position gives a more favorable angle of pull when raising the boom from the extreme lowered position. As on other Baker crane trucks all controls are conveniently located on the dash and do not swing with the superstructure permitting operators to do more work in a given time. The No-Plug travel controller makes careful and correct operation compulsory.

This Baker mobile crane is adapted to every industry where heavy loads must be lifted—for erecting work, for combined lifting and transporting operations, for placing work in machines and for many other applications. It supplements the overhead traveling crane and two or more units can work in the same bay, passing each other. Safety of operation is assured by good vision, a protecting guard for the operator and automatic limit stops and brakes on all motors.

Salvaging of Copper and Rubber

Like other large corporations, the Timken Roller Bearing Co., of Canton, Ohio, frequently accumulates sizable quantities of scrap electric cable. Until recently it has been the general practice to burn the rubber and cloth insulation off these cables to salvage the copper. Timken conservation men, seeking a method of salvaging cable rubber, experimented with a standard Buffalo bending roll machine. This consists of three smooth wheels, two of which are in tandem beneath a

third wheel which is centered above them. Varying pressures are exerted upon the material to be bent by raising or lowering the upper wheel.

Timken engineers removed the one lower wheel and replaced it with a notched gripper wheel. A sharp center-flanged wheel replaced the upper wheel. No change was made in the third wheel. This conversion proved extremely effective in removing the outer layer of cable cloth insulation and the inner layer of fine rubber, which is so urgently needed at the present time. The gripper wheel feeds the cable between the flanged

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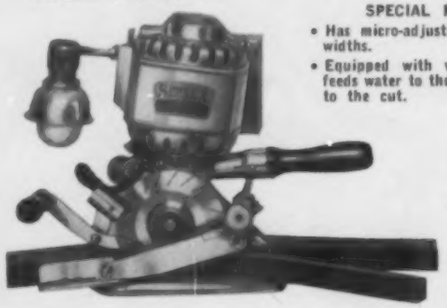

SPECIAL FEATURES

- Has micro-adjustment for accurate widths.
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cutter wheel and the pressure wheel, slicing the cable open and peeling it simultaneously. The cloth cable cover drops away from the rubber leaving the rubber and copper cable in a salable condition without further attention.

Cable rubber salvaging is accomplished at the rate of about 6 feet per minute. Cables ranging in size from 5/8-inch to 2 inches are easily handled. The machine is regularly used in connection with the sheet metal department and is converted to salvage use in about 3 minutes by simply replacing the two regular wheels, as here described.

BRIEFS . . .

The Clark Tructractor Division of Clark Equipment Co., Battle Creek, Mich., which has been building gas-powered **vehicles for handling materials,** parts and finished products in factories, terminals and docks for more than 20 years, is now providing these trucks with full electric equipment for storage battery power where electric operation seems best fitted to the job. The machines lift from 2,000 to 7,000 pounds, using an hydraulic vane type pump driven by special series wound motor.

A new line of **polyphase induction motors** in sizes from 1 to 20 h.p., NEMA frames 203 to 206 inclusive, suitable for use under magnesium dust conditions, has been announced by the General Electric Co., Schenectady, N. Y. The new line was developed to meet a need brought about by the extensive use of magnesium and aluminum in war production.

To meet the present day demand for standardization of equipment, the Ideal Commutator Dresser Co., Sycamore, Ill., has introduced a **new model etcher** to cover an extremely wide range of etching heats, one said to be equivalent to that of several ordinary etchers. The new unit, called the No. 18 Machine Shop Metal Etcher, has 14 heats from 115 to 1300 watts.

The Detroit Surfacing Machine Co., Detroit, Mich., has introduced a new model **Easy Reciprocating Electric Sanding Machine.** The new model features a detachable bottom plate. This is the part the felt, rubber or composition sanding pad is secured to and over which the abrasive is attached. The detachable feature permits instant removal of one type or size pad and installation of another.

For blackout, defense and other applications in important or hazardous areas where explosion-proof specification is imperative, Durakool, Inc., Elkhart, Indiana, has developed **hydrogenized explosion-proof relays.** The new relays feature low contact resistance, the elimination of arcing and pitting, and no parts to wear out.

To provide an efficient and simplified means of blacking out windows in accordance with local regulations, Clopay, Inc., Cincinnati, Ohio, has introduced **flame-proof blackout blinds.** The specially-developed blinds are made of heavy crepe fibre, are chemically flame-proofed, will fit any size windows, and are made to stop flying glass.

REVIEWS

BOOKS

Man and His Physical World. By Dwight E. Gray. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. 6 x 9 in. 665 pp. $3.75.

This is a textbook and is the outgrowth of the author's experience as the director of a science survey course required of all students except those majoring in a scientific field. Consequently, it is concerned primarily with the instruction of those students for whom it will constitute the principal, and in many cases, the only formal college contact with existing knowledge in the fields of astronomy, chemistry, geology and physics. The author is associate professor of physics at the University of Akron.

The book is divided into six major sections, as follows: Man and the Universe; Man and the History of the Earth; Man and the Tools of Science; Man and Materials; Man and Energy; and Man Applies Science. There is also an introduction to science and the scientific method, which includes a definition of science, a description of the scientific method, and the purposes of science.

Natural and synthetic rubber are treated in respective chapters in the section on Man and Materials. The treatment is of a general nature but the data is well compiled and reasonably condensed. The author does not attempt to treat too deeply with the complexity of rubber technology, but discusses two of the more important chemical reactions—vulcanization and oxidation. He prefers to call the synthetic rubbers "synthetic elastics" because, in the strict sense of the term, no true synthetic rubber has yet been developed. In discussing these "synthetic elastics" he includes historical background, types and examples, and properties and applications.

The book has 33 chapters in all, includes a reading list of recommended books, pamphlets, reports, etc., for further study, and has a complete subject index. Although intended for the college student, it makes interesting reading for the layman as well.

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Annual Report on the Progress of Rubber Technology: 1941. (Vol. 5). Edited by T. J. Drakeley. Published by the Institution of the Rubber Industry, 12 Whitehall, London, S.W.1, England. 7¼ x 9½ in. 145 pp. Price to Members: 2/6 (approximately 60c); Price to Non-Members: 10/6 (approximately $2.50).

(Available from *Book Department,* RUBBER AGE)

This latest report on the progress of rubber technology covers developments in all fields and branches which occurred during the year of 1941. Like previous editions, each subject is assigned to a prominent and recognized technologist or expert. The data is drawn from sources throughout the world and each chapter has a bibliography appended. The subjects covered, and their authors, follow:

Historical and Statistical Review, T. R. Dawson; *Planting and Production of Raw Rubber and Latex, Gutta-Percha, Balata, Chicle and Jelutong,* T. R. Dawson; *Properties, Applications and Utilization of Latex,* C. F. Flint; *Chemistry and Physics of Raw Rubber and Rubber Derivatives,* W. J. S. Naunton; *Synthetic Rubber,* B. J. Habgood; *Testing Equipment and Specifications Other than for Latex,* W. J. S. Naunton; *Compounding Ingredients, Accelerators, Antioxidants and Softeners,* F. H. Cotton; *Fibres and Textiles,* W. Knight; *Chemical and Physical Properties of Vulcanized Rubber,* A. E. T. Neale.

Tires, H. Stanley; *Belting,* G. F. Payne; *Hose and Tubing,* J. Kirkwood; *Cables and Electrical Insulation,* H. A. Daynes; *Footwear,* R. C. Davies; *Games, Sports Accessories, Toys,* J. P. Griffiths; *Mechanical Rubber Goods,* Herbert Rogers; *Roads,* G. E. Coombs; *Flooring,* J. Kirkwood; *Surgical*

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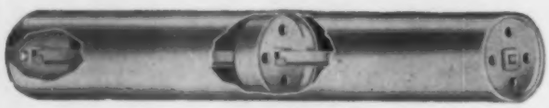

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The CARTER BELL MFG CO
CARTER BELL 1903 RUBBER SUBSTITUTES
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Goods, C. R. Pinnell; *Textile-Rubber Composites, Solvents, Cements,* W. N. Lister; *Sponge Rubber,* W. D. Guppy; *Hard Rubber,* B. L. Davies; *Works Processes, Materials, Including the Treatment of Raw Rubber in the Factory and the Treatment of Vulcanized Rubber,* F. H. Cotton; *Machinery and Appliances,* E. Morris.

Thanks are again due to Dr. Drakeley for the preparation of complete subject and author indexes. The I.R.I. is also to be complimented on its established intention to publish these annual reports despite the difficulties raised by wartime conditions.

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How to Build Independent Unions Under New Deal Legislation. By Harvey B. Rector. Published by Law Research Service, Ltd., Carew Tower, Cincinnati, Ohio. 4½ x 7 in. 138 pp.

Because the outcome of many independent labor organizations has been most unfortunate, largely due to misinformation and misconception of the law, this book has been compiled to enable any group of American workers to organize a bona fide independent labor organization within the meaning of the National Labor Relations Act and subject to certification by the National Labor Relations Board. It is intended to afford relief to any group of workers who feel that unions with which they are affiliated are dominated by racketeering interests which operate to their own advantage rather than to that of the individual worker. The author states in his preface that the book "is not intended to exploit labor" and in fact he leans backwards where existing unions are concerned.

BOOKLETS, CATALOGS, Etc.

Chemical Engineering Catalog: 1942-43. Published by the Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y. 8 x 11 in. 1336 pp.

The latest edition of this annual catalog, which well merits the sub-title of "The Process Industries' Own Catalog," is the twenty-seventh one to be issued, the first one having been inaugurated by the American Institute of Chemical Engineers in 1915. The sections have been completely revised with thousands of additions made. Like previous editions, it contains collected, condensed and standardized data on equipment, machinery, laboratory supplies, and heavy and fine chemicals and raw materials used in the industries employing chemical processes of manufacture. Classified indexes of the equipment and materials, all of which are carefully cross-referenced, are included as is a technical and scientific books section. The only statement that can be made about this latest edition is that it is bigger and better than any of its predecessors.

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Neoprene Inner Tubes. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Wilmington, Delaware. 6¼ x 9¼ in. 4 pp.

This bulletin contains information on the manufacture of inner tubes from an all-neoprene stock as compared with an all-rubber stock. Formulas and test data are included. The same processing technique was used in preparing both the neoprene and rubber stocks.

BEACON
Zinc Stearate
A DIRECT SOURCE OF SUPPLY
The Beacon Company
97 Bickford St., Boston, Mass.
COLITE — The BEST in Mold Lubricants

The Storage of 1:3 Butadiene. (Research Bulletin No. 7.381-B). Published by the Mellon Institute of Industrial Research, Pittsburgh, Penna. 8½ x 11 in. 36 pp.

Exceptionally timely, this report presents data on the storage of 1:3 butadiene, a problem which faces many chemical processors today, including the rubber manufacturers producing synthetic rubber in both their own and government-owned plants. The report contains new information and data on variables which affect storage costs, recommendations for types of storage containers, cost data, information regarding corrosive effects on container materials, and deterioration of butadiene during storage. Sections are also devoted to physical constants, chemical properties, and methods of preparation as they relate to storage problems. The report was prepared by the Pittsburgh-Des Moines Steel Co., through its Chemical Storage Fellowship at the Mellon Institute.

•

Extraction of Rubber from Plants. By Muriel E. Whalley. National Research Council of Canada, Ottawa, Canada. 8½ x 11 in. 19 pp. 25c.

This timely report on methods of extracting rubber from plants has been prepared as an aid to experimental work in this field. Some of the methods described are very old, many of them developed before world-wide use was made of the rubber plants in the East Indies, but nevertheless are valuable today. The report comprises three sections: (1) a section on methods in which the original articles have been reviewed in some detail; (2) a list of references; and (3) other material in abstract form of which complete articles were not readily available to the compiler.

•

Softener Study 2A for Hycar OR-15. Hycar Chemical Co., Akron, Ohio. 8½ x 11 in. 24 pp.

This report, which contains information on available softeners and plasticizers for Hycar OR-15 (formerly identified as Hycar O. R.), is largely the result of a series of evaluations that have been carried on since publication of the original Hycar softener study (RUBBER AGE, August, 1941). It is a supplement to the earlier work and in addition includes data on softeners and plasticizers listed in the first report that have proved to be satisfactory in general operations. Data is given on approximately 150 different softeners and plasticizers.

•

Stearns Suspended Separation Magnets. Stearns Magnetic Mfg. Co., Milwaukee, Wisconsin. 8½ x 11 in. 8 pp.

The company's line of circular type separator magnets, which have been used for years in special separator applications requiring the elimination of tramp iron, steel and other foreign material from various kinds of rock, slag, ores and other conveyed materials, is described and illustrated in this new bulletin. Reproductions of some typical applications are included.

•

Industry's War Production. National Association of Manfacturers, 14 West 49th St., New York, N. Y. 6 x 8½ in.

This booklet contains a number of factual reports on war production throughout the nation by top-flight newspaper correspondents based on a tour of 64 plants in 20 cities and 13 states. In addition to a general report, there are specific reports on aircraft, aluminum, guns and ammunition, machine tools, ships, steel, and tanks. It is an encouraging report.

SOFTENERS and PLASTICIZERS
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GALEX a non-oxidizing RESIN
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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, OCT. 13, 1942

Crude Rubber

SIGNING of agreements with Mexico and Panama, as reported elsewhere in this issue, brings to fifteen the number of agreements signed between the United States and Latin American countries. These agreements all follow a similar pattern, with the exception that the price varies depending on conditions within each country, in that they provide for exclusive purchase of all rubber by the Rubber Reserve Co. above that required for domestic consumption in the various countries. The pact with Mexico, however, differed in that it provided for the complete purchase of all guayule harvested in that country.

Considerable excitement was stirred in some rubber circles by the claim of Major Dove, an Army medical officer who recently returned to the United States after spending some fifteen years in Latin America, that this country could get all of the crude rubber it needed and then some if it would renegotiate its contracts with the South and Central American countries, incorporating in the new agreements a provision to pay $1.00 a pound for rubber. More than 1,500,000 tons would come from Brazil alone on the basis of this figure, according to the Army officer, who appeared before the Senate Agriculture Subcommittee which is investigating the rubber situation.

The plan to make Colombia an important rubber-producing area is progressing rapidly. According to reports from Bogota, twenty landing fields are being built in the remote jungles to bring the rubber out by air. One such field, it has been reported by War Minister Galvis, was completed in approximately twenty days. Although there is some attempt being made to plant new rubber for a long range program, most attention is being paid to the collection of wild rubber. Collectors are being outfitted, grubstaked and flown to the outposts by planes which carry wild rubber on the return trip.

Prices shown below are those set by the Rubber Reserve Co. Balata can now be secured from Rubber Reserve ex dock or ex warehouse at port of entry or f.o.b. cars at port of entry. Selling prices have been established for all types of balata, some of which are listed below:

As of October 13
Fixed Government Prices

Plantations—			
Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.22½
No. 2	—	@	.22¼
No. 3	—	@	.22
No. 4	—	@	.21¾
Thin Latex Crepe	—	@	.23 1/8
Thick Latex Crepe	—	@	.23 1/8
Brown Crepe, No. 1	—	@	.21⅜
Brown Crepe, No. 2	—	@	.21 1/8
Amber Crepe, No. 2	—	@	.21⅜
Amber Crepe, No. 3	—	@	.21 1/8
Brown Crepe, Rolled	—	@	.17 1/16
Latex—			
Normal, carload lots, tanks	—	@	.2595
Normal, carload lots, drums	—	@	.2825
Conc., carload lots, tanks	—	@	.2765
Conc., carload lots, drums	—	@	.2950
Guayule—			
Ampar	—	@	.28
Paras—			
Up-River, fine	—	@	—
Acre Bolivian, fine	—	@	—
Balata —			
Surinam Sheet	—	@	.81
Prime Manaos Block	—	@	.71
Peruvian Prime	—	@	.70
Venezuelan Block	—	@	.73

Scrap Rubber

The scrap rubber collected in the recent nation-wide campaign inaugurated by President Roosevelt is still flowing into trade channels. There is some talk in the trade to the effect that a revision in the method of collecting scrap by the Rubber Reserve's four designated agencies is pending, largely due to the complaints of other scrap dealers who allege that the $25.00 per ton price they are now getting is not entirely equitable. Based on anticipated increased demands from reclaimers, due to the new government program on tires, greater collection efforts are being expended by all agencies concerned with scrap to increase the stockpile still further. The armed forces are cooperating in this effort. Prices shown below are ceilings on typical scrap classifications:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$18.00
Beadless passenger tires	ton	24.00
Mixed truck tires	ton	18.00
Beadless truck tires	ton	24.00
No. 1 passenger peelings	ton	47.50
No. 1 truck peelings	ton	47.50
Gray carcass	ton	47.50
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06¾
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.05¼
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00
Black mechanical scrap, above 1.10	ton	20.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	— @	7.818
40x40	36 in.	6.15	lb.	— @	6.991
40x36	36 in.	6.50	lb.	— @	6.615
48x48	40 in.	2.50	lb.	— @	16.200
48x48	40 in.	2.85	lb.	— @	14.210
56x60	40 in.	3.60	lb.	— @	11.944
48x44	40 in.	3.75	lb.	— @	11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

The cotton market has moved very slowly in the past month, swinging in a narrow 40 point range since our last report. High for the month was 19.81 on September 15 and low 19.41 on September 21. Prices dropped steadily in mid-September, due primarily to scattered hedging and constant liquidation. It improved somewhat in the latter part of the month, as fixations absorbed the hedging operations. The intention of the farm bloc to include all labor costs in the computation of parity also served to strengthen the price, but the constant rumors that the President would veto any bill requiring the inclusion of all farm labor in computing parity served to hold it down. Prices rose again in early October, but for the most part the market marked time waiting for the new price administration to work out definitive ceiling formulas for cotton and other farm products. Such action is still awaited. A cotton crop of 13,818,000 bales has been estimated by the Crop Reporting Board. Quotations for middling uplands on the Exchange follow:

	Sept. 12	October 13		
	Close	High	Low	Close
October	18.25	17.86	17.82	17.82
December	18.47	18.17	18.08	18.09
March	18.60	18.42	18.34	18.34

Reclaimed Rubber

Although demand is still trailing the supply of reclaimed rubber, reclaimers are preparing to meet a greatly increased demand within the next few weeks from the tire field. It now seems quite evident that Rubber Director Jeffers will shortly give the tire industry the green light on all-reclaim tires, since he has adopted the Baruch Rubber report as his "textbook." OPA has set a ceiling price on the price of reclaim resold by the Rubber Reserve Co. accumulated as the result of the recent WPB order which permitted holders of idle or frozen stocks to dispose of them to Rubber Reserve. The ceiling price was set in an amendment to the reclaimed rubber price schedule. Prices shown below are ceilings on typical grades:

Shoe				
Unwashed	lb.	.07	@	.07¼
Tube				
Black Tube	lb.	.11¼	@	.11½
Red Tube	lb.	.12	@	.12¼
Tires				
Black (acid process)	lb.	.07½	@	.07¾
Black, selected tires	lb.	.06½	@	.06¾
Truck, Heavy Gravity	lb.	.08½	@	.08¾
Miscellaneous				
Mechanical blends	lb.	.04½	@	.05½
White	lb.	.13	@	.13¼

Ducks

Enameling (single filling)	lb.	— @	.44¼
Belting and Hose	lb.	— @	.39
Single filling, A grade	lb.	— @	.19¾
Double filling, A grade	lb.	— @	.20¾

The Problem — — —

One of To-day's Vital Needs Is to Extend Supplies of Rubber and Latex

One Solution —

Resin and Lacquer Emulsions

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Resin and Lacquer Emulsions have been finding an ever-widening use in many industries. They have proved invaluable in replacing other materials in adhesives, modifiers, binders and fillers, grease proofing, waterproofing, sizing, impregnating, coating, color dispersions and innumerable other uses.

In the Rubber Industry these emulsions are being used today as *Latex Modifiers* and *Complete Latex Replacements* to extend, thicken, stabilize, increase penetration, improve resistance to acids, oils and solvents; in *Coatings* to produce adherent pigmented or clear coatings on paper, fabric, and rubber and as intermediate coats for lacquer on rubberized cloth; in *Rubberizing* textiles; in *Latex Treated Papers* to increase strength and improve ageing; in *Adhesives*, for paper, for leather to cloth, and cloth to cloth.

These are just a few of the known applications in the rubber field. Undoubtedly in your own plant you will find many uses for these emulsions to improve your products and extend the supply of the vital materials, LATEX, RECLAIMS, and SYNTHETICS.

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VULPRENE A series of polymers designed to replace rubber for insulation, coatings, and moldings where the extreme flexibility, tensile strength, and abrasion resistance of rubber are not required. Available in a wide variety of modifications for individual requirements.

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EMULSION 58-8 A series of emulsified elastomers containing up to 65% solids. Recommended for use as full latex replacements in impregnation and combining.

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CHEMICAL MARKETS

New York, Oct. 13, 1942
All Prices F.O.B. Works

ACCELERATORS

Organic

A-1 (Thiocarbanilid)	lb.	.28 @	.33
A-10	lb.	.36 @	.42
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.60 @	.70
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.43 @	.45
Beutene	lb.	.59 @	.64
B-J-F	lb.	.38 @	.43
Butyl Zimate	lb.	— @	1.13
Captax	lb.	.38 @	.40
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.40 @	.47
Ethyl Zimate	lb.	— @	1.13
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.49 @	.50
Hepteen	lb.	.34 @	.39
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Ledate	lb.	— @	1.48
Methyl Tuads	lb.	— @	1.53
Methyl Zimate	lb.	— @	1.23
Monex	lb.	— @	1.53
Pentex	lb.	.74 @	.84
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	— @	1.65
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	1.55 @	1.70
Rotax	lb.	.48 @	.50
Safex	lb.	1.15 @	1.25
Selenac	lb.	— @	1.98
SPDX	lb.	.70 @	.75
Super-Sulfur No. 2	lb.	.13 @	.15
Thiocarbanilid, drums	lb.	.28 @	.33
Thiurad	lb.	— @	1.55
Trimene	lb.	.54 @	.64
base	lb.	1.03 @	1.18
Triphenylguanidine	lb.	.45 @	—
Ulto	lb.	1.25 @	1.75
Ureka	lb.	.50 @	.57
Blend B	lb.	.50 @	.57
Blend C	lb.	.48 @	.55
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—

Inorganic

Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Next Column)

Blues [b]

Prussian	lb.	.36 @	—
Ultramarine	lb.	.17 @	.27

Browns [b]

Mapico	lb.	.1135 @	—
Umber, Turkey	lb.	.04¾ @	—

Greens [b]

Chrome	lb.	— @	.25
Guignet's Green	lb.	.70 @	—

Reds

Antimony crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¾ @	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.096 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¾ @	—

Whites [b]

Cryptone No. 19	lb.	.0560 @	.0585
Cryptone CB No. 21	lb.	.0560 @	.0585
Cryptone ZS-800	lb.	.0825 @	.0850
Lithopone:			
Albalith	lb.	.04¼ @	.04½
Astrolith	lb.	.04½ @	.04½
Azolith	lb.	.04¼ @	.04½
Ray-cal	lb.	.05½ @	.05¾
Rayox	lb.	.14½ @	.15¼
Titanox A	lb.	.14½ @	.14¾
Titanox B	lb.	.05¾ @	.06
Titanox C	lb.	.05½ @	.05¾

Zinc Oxide—American Process [b]

American Azo:			
ZZZ (lead free)	lb.	.07¼ @	.07½
Anaconda, lead free	lb.	.07¾ @	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07½ @	.07½
XX Red—4	lb.	.07¼ @	.07½
XX Red—72	lb.	.07¼ @	.07½
XX Red—103	lb.	.07¼ @	.07½
Kadox, black label—15	lb.	.07½ @	.07½
Red label—17	lb.	.07¼ @	.07½
St. Joe, black label	lb.	.07¼ @	.07½
green label	lb.	.07¼ @	.07½
red label	lb.	.07¼ @	.07½
U. S. P.—7, bbls.	lb.	.10½ @	.10¾

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

Zinc Oxide—French Process [b]

Florence White Seal—7 bbl.	lb.	.09½ @	.09¾
Green seal—8	lb.	.09 @	.09¼
Red seal—9	lb.	.08½ @	.08¾

Yellows [b]

Cadmolith	lb.	.55 @	.60
Chrome	lb.	— @	.50
Mapico	lb.	.071 @	—

BLACKS
(In bags, carload lots)

Aerfloted Arrow	.0355 @	—
Certified	.0355 @	—
Certified Spheron	.0355 @	—
Channel "S"	.12 @	—
Continental	.0355 @	—
Disperso	.0355 @	—
Dixiedensed	.0355 @	—
Dixiedensed 66	.0355 @	—
Excello	.0355 @	—
Furnex	.03½ @	.06
Furnex Beads	.03½ @	.06
Gastex	.03½ @	.06
Kosmobile	.0355 @	—
Kosmobile 66	.0355 @	—
Kosmos-Dixie 20	.03½ @	.06
Micronex (Amarillo)	.0355 @	—
Micronex Beads (Amarillo)	.0355 @	—
Pelletex	.03½ @	.06
P-33	.0475 @	—
Shell Carbon (Del. Midwest)	.025 @	—
Supreme	.0355 @	—
Thermax	.0225 @	—
Thermax "S"	.0675 @	—
Wyex	.0355 @	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00	@24.50
99½%-300	ton	—	@16.50
86-90%-300	ton	—	@13.50
Asbestine	ton	16.50	@20.00
Barium carbonate (98-100%)	ton	47.00	@49.00
Barytes	ton	25.35	@36.00
Bentonite	ton	11.00	@16.00
Blanc fixe, dry	ton	60.00	@67.50
Calcene	ton	37.50	@43.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white	ton	32.50	@45.00
Clay, Aerfloted, Suprex	ton	10.00	@22.50
Aerfloted Paragon	ton	10.00	@22.50
Crown (f.o.b. plant)	ton	11.00	@ —
Dixie	ton	—	@11.00
Langford	ton	—	@ 8.50
McNamee	ton	—	@10.00
Par	ton	—	@11.00
Witco	ton	10.00	@ —
Cotton Flock (Dark)	lb.	.10½ @	.13
Kalite No. 1	ton	—	@26.00
Kalite No. 3	ton	—	@36.00
Kalvan	ton	—	@100.00
Kalvan "S"	lb.	— @	.09½
Magnesium carbonate	lb.	.06¾ @	—
Mica	ton	35.00	@44.00
Mineralite	ton	—	@30.00
Pyrax A	ton	—	@ 7.50
Rottenstone (powd. Dom.)	ton	25.50	@37.50
Rubberol	lb.	— @	.17½
Silene (calcium silicate)	lb.	.04 @	.045
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	17.00	@25.00
Whiting, commercial	ton	16.00	@26.00
Columbia Filler	ton	9.00	@14.00
Witco	ton	6.00	@ —
Wood Flour (100 mesh)	ton	30.00	@32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00 @	—
Black Diamond	ton	25.00 @	—
Genasco, solid (factory)	ton	— @	—
Hard Hydrocarbon	ton	25.00 @	27.00
MilliMar	lb.	— @	.05½
Parmr, solid	ton	— @	—
Pioneer, M R, solid	ton	— @	—

MISCELLANEOUS

Aromatics—Rodo #0	lb.	4.00 @	4.50
Rodo #10	lb.	5.00 @	5.50
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors	lb.	4.50 @	—
Aresklene No. 375	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.34
Santomerse S	lb.	.11 @	.25
Sponge Paste	lb.	— @	.18
Sunproof	lb.	.22¾ @	.27¾
Tackol (tackifier)	lb.	.085 @	.18
Tonox	lb.	.50 @	.59
Ty-Ply	gal.	6.75 @	8.00
Unicel (blowing agent)	lb.	.50 @	—

SOFTENERS

Acids

Acetic, 28%, bbls.[a]	100 lb.	3.38 @	3.63
Nitric, 36 degrees	cwt.	5.00 @	—

Acids, Fatty

Laurex	lb.	.14¾ @	.17¼
SL 210	lb.	.12 @	.14
Stearex Beads	lb.	.10 @	.11
Stearite	lb.	.10 @	—

Alkalies

Caustic Soda, 76%	cwt.	2.70 @	5.70
Soda Ash, 58%	cwt.	1.15 @	2.98

Oils

Cycline Oil	gal.	.14 @	.2[illegible]
Degras, bbls.	lb.	.12 @	.12½
Para-Flux	gal.	.17 @	.18
Para-Lube	lb.	.046 @	.048
Petrolatum, amber [b]	lb.	.03¾ @	.04½
Pigmentaroil, tank cars	gal.	.20½ @	—
in drums	gal.	.26½ @	.27½
Pine, tanks	gal.	.55 @	—
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol	lb.	.13½ @	.14
Rubtack	lb.	.10 @	—
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	— @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—

Resins and Pitches

Pitch, Burgundy	lb.	.07½ @	.08
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	— @	4.50
Pigmentar, tank cars	gal.	.20½ @	—
in drums	gal.	.26½ @	.27½
Retort Pine Tar, drums	gal.	.26½ @	.27½

Solvents

Acetone, pure [a]	lb.	.07 @	.173
Benzene, 90%, tank car	gal.	.14 @	—
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.05
Carbon, bisulfide	lb.	.05 @	.08½
Carbon tetrachloride	gal.	.73 @	1.27
Dichlorethylene	lb.	— @	—
Dipentene, cml., drums	gal.	.48 @	.50
Ethylene dichloride	lb.	.07½ @	.08¼
Plastogen	lb.	.07¾ @	.08
Reogen (drums)	lb.	.11½ @	.12
Rub-Sol	gal.	.09½ @	—
Trichlorethylene	lb.	.08 @	.09½
Turpentine, spirits	gal.	.69½ @	.73½
dest. dist., drums	gal.	.50 @	.55

Waxes

Beeswax, white [b]	lb.	.61 @	—
Carnauba, yellow [b]	lb.	.86 @	.88
Ceresin, white, dom.	lb.	.13½ @	.15
Montan, crude	lb.	.45 @	.46
Paraffin [a]			
Yellow crude scale, 124/126	lb.	.04¼ @	—
Refined, 123/125	lb.	.05¼ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.95 @	2.05
Gel	lb.	.56 @	.58
Hipar	lb.	.64 @	.66
Powder	lb.	.48 @	.50
Resin	lb.	.48 @	.50
Resin D	lb.	.48 @	.50
White	lb.	1.23 @	1.33
Albasan	lb.	.69 @	.74
Antox	lb.	.54 @	.56
B-L-E	lb.	.48 @	.57
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone A, B, C, D, E	lb.	.48 @	.63
Oxynone	lb.	.77 @	.90
Retardex	lb.	.45 @	.48
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.48 @	.57

EXTENDERS

Naftolen	lb.	.15 @	.25
Vanzak	gal.	.05 @	.06

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Colite	gal.	.90 @	1.15
Dipex	lb.	.06 @	.08
Glycerized Liquid Lubricant	gal.	— @	1.35
Lubrex	lb.	.25 @	.30
Mineralite	ton	— @	30.00
Mold Paste	lb.	.12 @	.18
Sericite	ton	65.00 @	75.00
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25 @	—
Amberex Type B	lb.	.18¾ @	—
Black	lb.	.08½ @	.13
White	lb.	.09 @	.15
Brown	lb.	.10 @	.14
Neophax A	lb.	.16½ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.08 @	.12
Sulfur Chloride, yellow (drs.)	lb.	.03 @	.08
Sulfur, rubber makers			
Refined (bags)	cwt.	2.55 @	—
Commercial (bags)	cwt.	2.20 @	—
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Industry.

The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York, N. Y.

Chemicals and Compounding Materials —

ACCELERATOR Z 51
- Good Aging Properties
- Free from Rapid Overcure
- Safe Processing Properties
- Low Dosages for Optimum Cures

Advance Solvents & Chem. Corp.
245 Fifth Ave. New York, N. Y.

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-46; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H. White; Santoflex B, BX; Santovar A.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York, N. Y.

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 39 years.*
The Aluminum Flake Co.
Akron, Ohio

ALUMINUM HYDRATES
"Alorco" Hydrated Aluminas reinforcing pigments give many desirable properties to rubber. Send for sample.
ALUMINUM CO. OF AMERICA
1970 Gulf Bldg. Pittsburgh, Pa.

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CALCENE— The Ideal low gravity, white reinforcing pigment. Gives high tensile and elongation properties with exceptionally good resistance to tear and abrasion.
PITTSBURGH PLATE GLASS CO., COLUMBIA CHEMICAL DIV.
Grant Bldg., Pittsburgh, Pa.

CARBON BLACK— *Micronex*
the world's standard gas black, universally known as the "King of Rubber Pigments."
Binney & Smith Co.
41 East 42nd St. New York City

CARBON BLACK
CONTINENTAL
The Newest Name in Carbon Black offers
CONTINENTAL DUSTLESS
CONTINENTAL COMPRESSED
CONTINENTAL UNCOMPRESSED
Continental Carbon Company
295 Madison Ave., New York, N.Y.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
J. M. Huber, Inc.
460 West 34th St. New York

CARBON BLACK
"Atlantic" Carbon Blacks meet the exacting standards of modern rubber production.
Chas. Eneu Johnson & Co., Mfrs.
Distributed by
C. P. HALL CO.
Akron — Boston — Los Angeles — Chicago

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CARBON BLACK
WITCO DISPERSO
and DUSTLESS and a
Complete Line of High Quality
Rubber Chemicals
Wishnick-Tumpeer, Inc.
295 Madison Ave., New York, N.Y.

Do you believe in Your Products?
Then you should believe in telling the rubber industry about them. The MARKET PLACE is the logical place to display your wares.

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
33 Rector Street New York City

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
Ernest Jacoby & Co.
79 Milk St. Boston Mass.
Cable Address: Jacobite Boston

CHEMICALS

For Rubber		For Industry Generally
Accelerators	*Acids*	*Latex*
Antioxidants	*Oil of Myrbane*	*Lotol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK

CHEMICALS
For Natural & Synthetic Rubber
"PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.
Pennsylvania Industrial Chem. Corp.
Clairton Penna.

CHEMICALS
A complete line of plasticizers, resins, substitutes, fillers, etc., for Synthetic, Natural and Reclaimed Rubber.
STANDARD CHEMICAL COMPANY
Akron Savings & Loan Bldg, Akron

CHEMICALS AND MINERAL
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York

COAL TAR CHEMICALS

Coumarone Resins	Tack Producers
Resinous Oils	Dispersing Oils
Reclaiming Oils	Softeners
Solvents	

The Neville Company
Neville Island, Pittsburgh, Penna.

The Market Place

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Rubber Industry. If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York, N. Y.

Chemicals and Compounding Materials {continued}

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS

HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

FACTICE— Prevents blooming, makes colors fast and a smoother batch.

Stamford Rubber Supply Co.
Stamford, Conn.

PARA-DORS—
overcome odors in rubber—effectively and at low cost.

GIVAUDAN-DELAWANNA, INC.
Industrial Aromatics Division
330 West 42nd St., New York, N. Y.

COLORS
BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures

MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

FURNEX—FURNEX BEADS
—A cool mixing reinforcing black for Footwear and Mechanicals. Good ageing —Improved oil resistance.

Binney & Smith Co.
41 East 42nd St. New York City

PARA-FLUX
The Universal Softener—Adaptable, Uniform. Improves Quality—Economical.

The C. P. Hall Co.
2510 First Central Tower
Akron Ohio

COMPOUNDING Materials

Vulcanizing Agents	Pigments
Accelerators	Clays
Antioxidants	Mineral Rubber
Plasticisers	Aromatics
Dispersons	Blacks

R. T. VANDERBILT CO.
230 Park Ave. New York City

GASTEX
Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.
GENERAL ATLAS CARBON DIV.,
GENERAL PROPERTIES CO., INC.
60 Wall St. New York

PELLETEX (The pellet *Gastex*)
The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.

GENERAL ATLAS CARBON DIV.,
GENERAL PROPERTIES CO., INC.
60 Wall St. New York

CUMAR —Paracoumarone Resin.
A neutral gum for rubber compounding.
Samples and prices on request.

The Barrett Div.
Allied Chemical & Dye Corp.
40 Rector St. New York City

IRON OXIDES
Asbestine—Barytes—Talc—Soapstone

C. K. Williams & Co.
EASTON, PA.

RUBBER PROCESSING OILS
For outstanding compatibility in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
Philadelphia Pennsylvania

DU PONT Rubber Chemicals
DU PONT RUBBER COLORS
DU PONT ACCELERATORS
DU PONT ANTI-OXIDANTS

E. I. du Pont de Nemours & Co., Inc.
RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

MAGNESIUM OXIDE
Calcined Magnesium Oxide prepared for use in the compounding of neoprene. Full details on request.

J. T. Baker Chemical Co.
Phillipsburg New Jersey

RUBBER SUBSTITUTES
White, brown and black.

The Carter Bell Mfg. Co.
Springfield, New Jersey

EXTENDER
NAFTOLEN R 100 — Extender for Crude Rubber, Reclaim, Synthetics.

Wilmington Chemical Corporation
10 E. 40th St., New York, N. Y.

MAPICO COLORS
Pure Oxides of Iron
Yellows—Reds—Browns—Black

MAGNETIC PIGMENT CO.
Manufacturers
BINNEY & SMITH CO.
Distributors
41 East 42nd Street, New York, N. Y.

SOFTENERS
Rosin Oil — Pine Tar
Burgundy Pitch
"Galex" — a non-oxidizing Resin

National Rosin Oil & Size Co.
RKO Bldg. New York, N. Y.

THE MARKET PLACE
is the acknowledged Buyers' Guide to products and services in the rubber industry.
Use it—for RESULTS!

MOLD LUBRICANT
"Orvus" enables articles to leave molds readily; molds clean easily. Effective in hardest water. Also acts as thorough cleanser for molded and extruded rubber goods.

PROCTER & GAMBLE
Cincinnati Ohio

SOLVENTS
"Skellysolve"—A superior solvent in six different types for various uses—for making rubber cements—for many different rubber fabricating operations.

SKELLY OIL CO., SOLVENTS DIV.
Skelly Bldg., Kansas City, Mo.

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Chemicals and Compounding Materials (continued)

STEARIC ACID
STEAREX . . . CAKE or POWDER
STEAREX BEAD
Standardized Products for Rubber Compounding
MINERAL RUBBER (Parmr), TALC
SOAPSTONE
Binney & Smith Co.
41 East 42nd St. New York City

WAXES
Johnson's lustrous wax finishes retard oxidation, reduce friction, surface wear, tackiness.
S. C. JOHNSON & SON, INC.
Racine Wisc.

ZINC OXIDE PIGMENTS
The XX Reds Kadox
ZINC SULPHIDE PIGMENTS
The Cryptones The Albaliths (Lithopones)
The New Jersey Zinc Sales Co.
New York *Chicago*
Cleveland, Boston, San Francisco

SULPHURS
Rubbermakers' TIRE BRAND and TUBE BRAND. Also CRYSTEX Insoluble Sulphur, Sulphur Chloride, Caustic Soda, Carbon Bi-Sulphide, Carbon Tetra-Chloride.
Stauffer Chemical Company
2710 Graybar Bldg., New York City

ZINC OXIDES
AZO ZZZ Zinc Oxides
lead free—pure—uniform—dependable
AZO ZZZ-11 AZO ZZZ-55
AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66
American Zinc Sales Company
Columbus, Ohio *New York*
Chicago *St. Louis*

ZINC OXIDES
Black Label Red Label Green Label
Manufactured by Our New Electrothermic Process
St. Joseph Lead Co.
250 Park Ave., New York
Plant and Laboratory: Monaca (Josephtown), Pa.

TITANIUM PIGMENTS
TITANOX-A (Titanium Dioxide)
TITANOX-B (Titanium Barium Pigment)
TITANOX-C (Titanium Calcium Pigment)
TITANOX-L (Lead Titanate)
TITANIUM PIGMENT CORP.
SELLING AGENTS
111 Broadway, New York, N. Y.
104 S. Michigan Ave., Chicago, Ill.

The Progressive Concern Selling to Rubber Manufacturers Uses
THE MARKET PLACE
for Results

ZINC STEARATE
ZINC LAURATE
Colite Mold Lubricant for Extra High Gloss
THE BEACON COMPANY
87 Bickford St., Boston, Mass.

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BANBURYS REPAIRED
Re-building and re-surfacing rotors and mixing chambers has been our specialty for years.
INTERSTATE WELDING SERVICE
914 Miami St. Akron, Ohio

DIAL GAUGES—Thickness
For measuring the thickness of rubber and similar materials. Many models.
Frank E. Randall
248 Ash St.,
Waltham Mass.

GRINDING MILLS
SPAN grinding mill reduces soft and hard rubber to fine powder.
Made in U. S. A.
M. Pancorbo
155 John St. New York, N. Y.

CALENDER SHELLS
Gammeter's
ALL STEEL Calender Shells.
All welded. Any size.
New and better.
The W. F. GAMMETER CO.
Cadiz Ohio

DRYING MACHINERY
For Synthetic Rubber, Reclaimed Rubber, Latex Processed Materials, etc.
PROCTOR & SCHWARTZ, INC.
Seventh St. & Tabor Rd. Philadelphia, Pa.

MACHINERY—RUBBER
"Master" Tube Molds, Tire Vulcanizers, Molds and Cores, Tire Drums, Tubers, etc.
Special Machinery Built to Order
Akron Standard Mold Co.
Akron, Ohio

CUTTING DIES
Cutting and perforating dies of all types for rubber manufacturers.
Send for our quotations
Brockton Cutting Die & Machine Co.
Avon, Mass.

EXTRUDERS
The pioneer line of tubers, strainers and wire insulating machines. For latest developments inquire of
JOHN ROYLE & SONS
Paterson New Jersey

MACHINERY
L. ALBERT & SON
Trenton, N. J. Stoughton, Mass.
Los Angeles, Calif. Akron, O.

CUTTING MACHINERY
Specialists in Rubber Cutting Equipment for Bands, Crude Stock, Jar Rings, Tubes, Rollers, Washers, Treads, Cement Stock, etc.
See Black Rock for All Cutting Problems
Black Rock Manufacturing Co.
179 Osborne St. Bridgeport, Conn.

FORMS - PORCELAIN
Exclusive Manufacturers of
Vitreous Porcelain Closed End Forms
No matter what shape or design—we can make it. Send blue print or sketch for our prices.
The Colonial Insulator Co.
936 Grant St. Akron, Ohio

MACHINERY
A complete service from the design of machinery to finished products of all kinds. Equipment for Plantations — also Reclaim, Latex and Rubber Plants.
Layouts — Formulas — Processes
Continental Machinery Company
305 BROADWAY, NEW YORK, N. Y.

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Machinery and Equipment {continued}

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Cutting, Trimming, Skiving, Cementing, Eyeletting, Cutting Dies—Eyelets.
United Shoe Machinery Corp.
140 Federal St., Boston, Mass.

MOLDS
For tires, rubber specialties and mechanical goods; general machine work.
The Akron Equipment Co.
Akron, Ohio

STOCK SHELLS
A Type for Every Need—Large Diameter—Light Weight—Extra Strong—Seamless.
National Sherardizing & Machine Co.
Hartford, Conn. Akron, Ohio

MAGNETIC EQUIPMENT of All Kinds
Separators, Clutches, Rolls, Drums, Brakes, Special Magnets
Stearns Magnetic Mfg. Co.
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Processing Equipment For Reclaiming Rubber
Attrition Mills; Conveyors; Crushers; Cutters; Elevators; "Frigidisc" Grinders; Hammer Mills; Mixers, Sifters, etc.
ROBINSON MFG. CO.
30 Church St., New York, N. Y.

TESTING MACHINES
RUBBER TENSILE TEST MACHINES
TEXTILE TESTING MACHINES
Write for Descriptive Literature
Henry L. Scott Co.
P. O. Box 963 Providence, R. I.

MANDRELS—All Types
Circular and Straight—Aluminum and Steel Licensed Under Clyde E. Lowe Co. Patents Sherardizing and Chrome Plating Machinery—Air Bag & Mandrel Polishing
National Sherardizing & Machine Co.
Hartford, Conn. Akron, Ohio

RUBBER STRIP CUTTER
Strips slab rubber up to 1" thick, 10,000 feet in 8 hours. Any width. Tolerance 1/64 to 1/100 inch. No rejects. Write for full details.
Simplex Cloth Cutting Mach. Co.
270 W. 39th St., New York, N. Y.

WEATHERING UNIT
The National X-1-A Accelerated Weathering Unit quietly evaluates substitute materials, new formulas, established products.
NATIONAL CARBON CO., INC.
Carbon Sales Div.
Cleveland, Ohio

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THE MARKET PLACE
Show What You Have to Sell

SPECIAL MACHINERY
For Quality and Efficiency in Working Rubber. Consult us about your problems.
Utility Manufacturing Co.
Cudahy, Wisconsin

The Progressive Concern Selling to Rubber Manufacturers Uses
THE MARKET PLACE
for Results

Rubber—Crude; Scrap; Latex; Dispersions

GUAYULE RUBBER
"AMPAR" BRAND
Washed and Dried
Continental Rubber Co. of N. Y.
745 Fifth Avenue New York

CRUDE RUBBER
SCRAP RUBBER
HARD RUBBER DUST
BALATA — GUTTA PERCHA
Hermann Weber Company
67 Broad St., New York

LATEX
Normal, Concentrated, Processed
HEVEATEX CORPORATION
78 Goodyear Ave., Melrose, Mass.
Offices in New York, Akron, Chicago

CREPE RUBBER
Specialists in Latex Crepe
Charles F. Connor & Co., Inc.
110 State St., Boston, Mass.
Telephone: LAFayette 3690

CRUDE RUBBER PERMITS
Our long experience ideally equips us for the prompt, efficient handling of Manufacturers' Crude Rubber Purchase Permits.
Baird Rubber & Trading Co., Inc.
233 Broadway New York, N. Y.

LOTOL
(Compounded Latex)
Ready to use
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
Rockefeller Center, New York, N. Y.
Offices in Detroit, Boston, Indianapolis

CRUDE RUBBER
SCRAP RUBBER
Also HARD RUBBER DUST
H. Muehlstein & Co., Inc.
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BRANCHES: Akron, Chicago, Boston, Detroit, Los Angeles, London, Paris

DISPERSITE
Water Dispersed Rubber
(Reclaimed—Crude—Synthetics)
Man-made Alternate for Latex
Dispersions Process, Inc.
1230 Sixth Ave., New York, N. Y.
Offices in Detroit, Boston, Indianapolis

REVERTEX
Highly Concentrated (About 75%)
Rubber Latex
Sole Distributor for U. S. A. and Canada
Revertex Corp. of America
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Rubber [Cont'd]

RUBBER
Crude Rubber
Liquid Latex
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

RUBBER—
Scrap and Crude
Also HARD RUBBER DUST
A. Schulman, Inc.
Darrow Road, Akron, Ohio
1401 Mississippi Ave., E. St. Louis, Ill.
736 Statler Bldg., Boston, Mass.
Warehouses at Akron and E. St. Louis

VULTEX— THE ONLY VULCANIZED LATEX
Insures Highest Quality, Uniformity, Economy, Simplicity of Application.
FULLY PROTECTED BY PATENTS
Also Latex and Latex Compounds
General Latex & Chemical Corp.
Successors to the Vultex Chemical Company
666 Main St. Cambridge, Mass.

Reclaimed Rubber . . . .

NERVASTRAL
RECLAIMING PROCESSES
HIGH GRADE — HIGH SPEED
HIGH ECONOMY
Rubber & Plastics Compounds Co., Inc.
30 Rockefeller Plaza, New York, N. Y.
Tel: COlumbus 5-0085

RECLAIMED RUBBER—
For All Purposes
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 Sixth Ave., N. Y. City

RECLAIMED RUBBER—
Uniformity, reliability, cleanliness
PEQUANOC RUBBER CO.
Butler, N. J.

RECLAIMED RUBBER—
A standardized grade for every requirement.
U. S. Rubber Reclaiming Co., Inc.
500 Fifth Ave., New York, N. Y.
"59 Years Serving the Industry Solely as Reclaimers"

Rubber—Synthetic

HYCAR
For extreme resistance to heat, abrasion, oil, gasoline, aging, and deterioration.
HYCAR CHEMICAL COMPANY
335 South Main St.
Akron Ohio

NEOPRENE
In different types to meet stringent requirements.
The Neoprene Notebook carries up-to-date information on neoprene. Ask for it.
E. I. du Pont de Nemours & Co., Inc.
Rubber Chemicals Div.
Wilmington Del.

PERBUNAN
Oil Resistance—Heat Resistance
Long Life
Full information upon request.
STANCO DISTRIBUTORS, INC.
26 Broadway New York, N. Y.

THIOKOL
Synthetic rubber available in several types, including powder form. Excellent heat and solvent resistance.
THIOKOL CORPORATION
Trenton N. J.

YOUR PRODUCTS
Should be displayed in
THE MARKET PLACE
Show What You Have to Sell

Miscellaneous

Use the
MARKET PLACE
Section

To Display
Your Products
It Brings Results!

Fabrics—Liners, Hollands

CUSTOM FINISHERS of
RUBBER REPELLENT LINERS
Capitol Process Liner Treatment
—
Textile Proofers, Inc.
One Gates Ave. Jersey City, N. J.

LINERS TREATED
Advantages of Porotex Treatment
1. All Compounds stripped easily. 2. Wrinkles never cause liners to crack. 3. Prevents rot; liners rendered heat and oil-proof. 4. Liners remain porous, reducing tendency to trap air.
POROTEX PRODUCTS
875 East 140th St. Cleveland, Ohio

PROCESSED LINERS
"CLIMCO"—Fabrics treated to prevent adhesion of rubber stocks.
"LINERETTE"—Treated paper for separating or interleaving light weight rubber stocks.
The Cleveland Liner & Mfg. Co.
5508 Maurice Ave., Cleveland, Ohio

Consultants

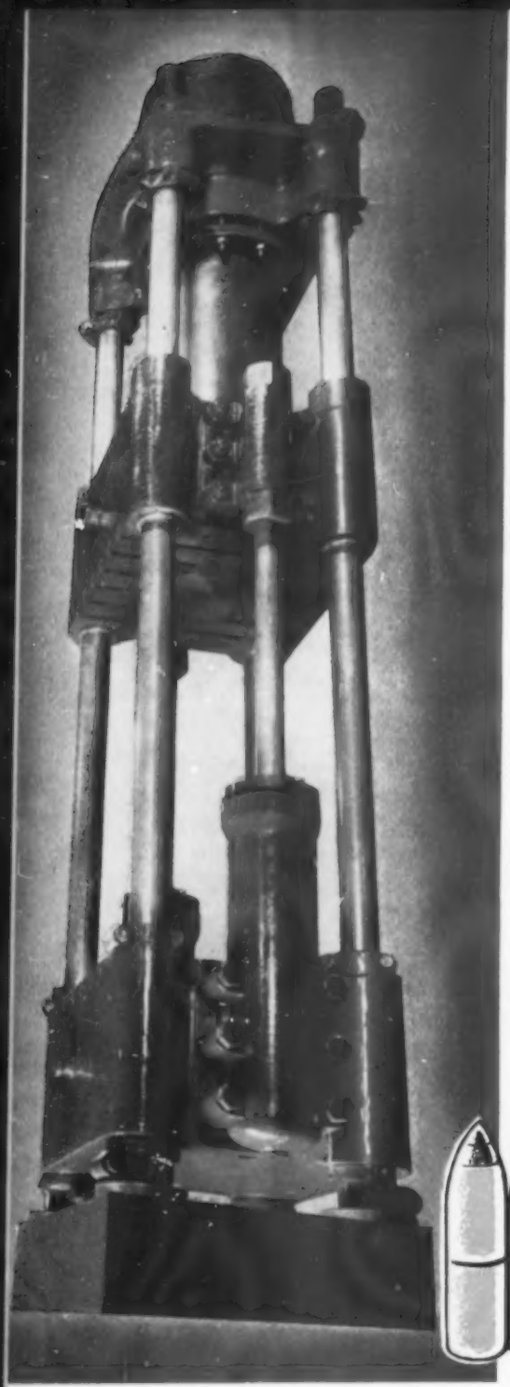
CONSULTING
LATEX TECHNOLOGIST
—
R. J. Noble, Ph.D.
21 Woodland Road, Malden, Mass.

CONSULTING
Rubber Technologist
R. R. Olin Laboratories
P. O. BOX 372. AKRON, OHIO
Telephones: Sherwood 3724, Franklin 8551

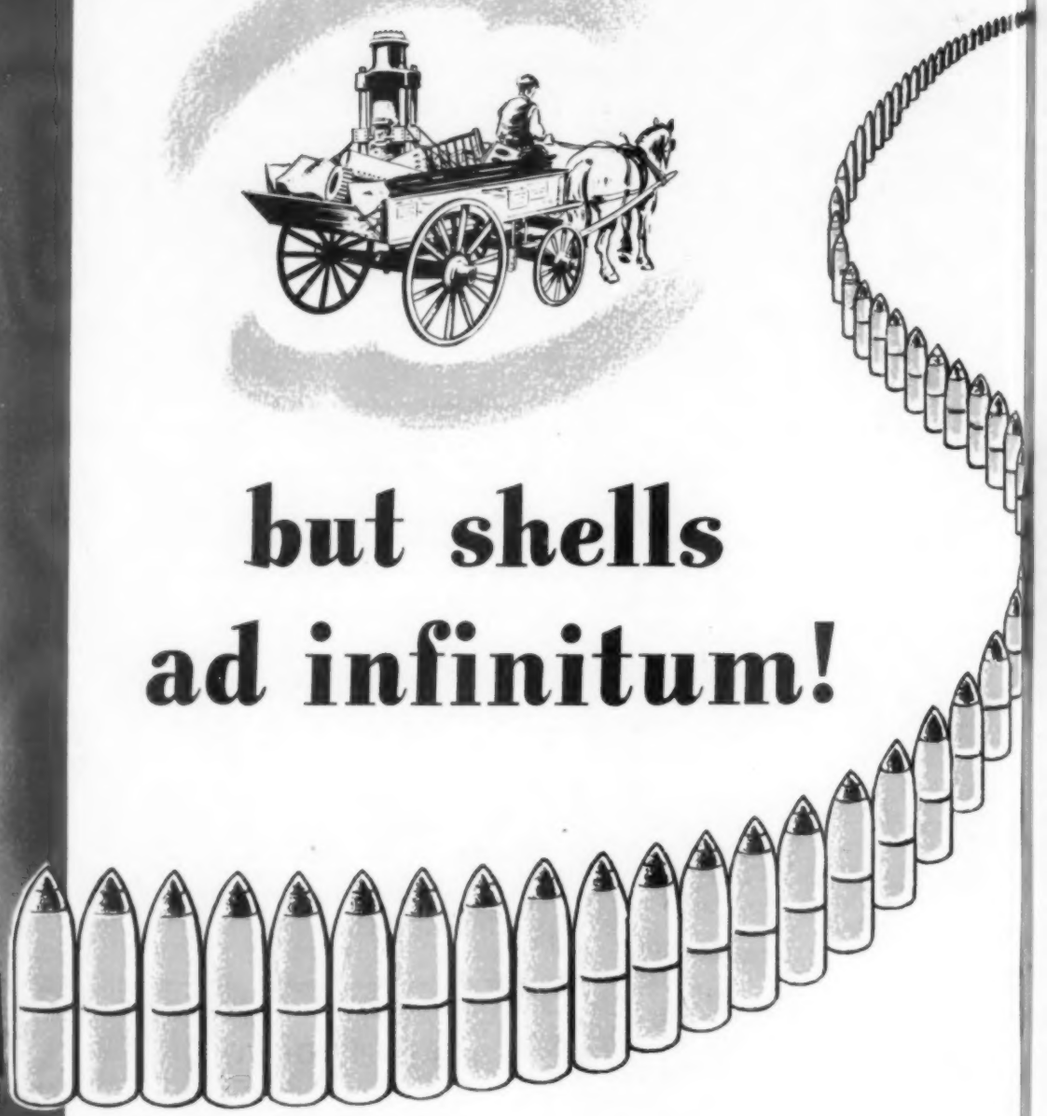
Rubber Mnfrs.

MECHANICAL MOLDED
RUBBER GOODS
Sponge Rubber: Sheeted—Die Cut—Molded
Your Inquiries Solicited
Barr Rubber Products Co.
Sandusky, Ohio

SANITARY GOODS—
Dress Shields, Baby Pants, Aprons, Elastic Belts, Bloomers, Stepins, Bibs, Guimps and Brassieres.
SPECIAL GOODS CUT TO ORDER
Rand Rubber Co., Inc.
Summer Ave. & Halsey St., Brooklyn, N. Y.



not shells a la carte...



but shells ad infinitum!

ALTHOUGH America needs scrap metal, machines like this do not belong to the scrapping program. They have more fighting power as machines than as metal. Our stock at the present time is being combed for older, obsolete types which are fed as scrap to the jaws of America's melting-furnaces.

The former owners of this battery box press, once used in making equipment for civilian pleasure cars, would hardly recognize their press — now converted into an efficient machine for piercing and drawing shell casings. This peace-time device has become a vital unit in one of America's huge shell plants, laboring tirelessly on the production lines that spell defeat for our enemies . . . turning out endless streams of ammunition to blast the Axis.

We are basically purveyors of machinery to the rubber industry, but today we convert such machinery for many other purposes. From our tremendous stocks in four warehouses, we can furnish everything from the smallest replacement part to complete installations for rubber and plastic manufacturing, as well as equipment for shell plants and other essential war industries.

Thus Albert engineers and foresightedness are "beating plowshares into swords" for victory!

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WANT ADS

RATES: Five cents per word, minimum charge $2.00, except POSITIONS WANTED, $1.00 for 40 words or less, extra three cents per word. All classified advertisements payable in advance. Address replies to box numbers care of RUBBER AGE, 250 West 57th St., New York.

POSITIONS WANTED

CHEMIST—with over 14 years' experience in rubber research and compounding, including development of synthetic rubbers and their processing and compounding. Have full knowledge of development and manufacture of tires, mechanicals, proofed goods, latex and latex sponge, dipped goods, etc. Age 38. Available immediately. Address Box 1277, RUBBER AGE.

ADMINISTRATOR or manager of rubber or other plantations. Agricultural College graduate, broad experience in tropical and subtropical agriculture. Foreign languages. Executive abilities, reliable. Willing to invest. Highly recommended. Address Box 1239, RUBBER AGE.

TWENTY-TWO YEARS practical experience in compounding and factory management. Sponge and all types of rubber products. Will accept position with small wide-awake concern. Address Box 1275, RUBBER AGE.

CHEMIST—14 years experience in compounding natural and synthetic rubber. Eight of these in reclaimed rubber manufacture. Experienced in sponge, hard rubber, automotive and industrial. Details and references can be furnished on request. Address Box 1273, RUBBER AGE.

HELP WANTED

WANTED—SALESMAN. We have some territory open on mechanical rubber molded goods and sponge rubber products in sheets, die cut and molded parts of all descriptions. Address MIDLAND RUBBER COMPANY, Cedar Rapids, Iowa.

WANTED—By large organization, man or woman familiar with leading companies in rubber industry, and able to undertake analytical work. Must be able to write clearly and concisely for publication. Reply should outline applicant's age, education, experience, number dependents and salary desired. Address Box 1272, RUBBER AGE.

CHEMIST—Experienced in the coating of fabrics (calender and spreader processes) with rubber, reclaim, synthetic rubber and synthetic resins preferred. Applicant must be an American citizen with acceptable references. Particularly good opportunity with old established eastern company, currently fully on war work. Give full particulars about self, experience, salary desired. Address Box 1264, RUBBER AGE.

MECHANICAL ENGINEER for research and semi-commercial supervision in Eastern Massachusetts chemical concern. Some knowledge of calendering desirable. Please give training, experience, personal data and expected salary. Address Box 1263, RUBBER AGE.

PLANT ENGINEER. By Eastern Rubber Manufacturer. Must be experienced on all types rubber machinery, upkeep of buildings, handling employees, etc. Give age, references and experience. Address Box 1268, RUBBER AGE.

PLANTS WANTED

SMALL EQUIPPED RUBBER PLANT. METROPOLITAN NEW YORK AREA PREFERRED. GIVE FULL DETAILS. Address Box 1252, RUBBER AGE.

FOR SALE

FOR SALE: 1—W.S. Hydro-Pneumatic Accumulator, 2500 PSI, 8 gal. with IR m. d. compressor; 1—W.S. 15" x 18" Hydraulic Press, 9" dia. ram, 4" posts; 6—Semi-Automatic Hydraulic Presses; 1—Farrel Birmingham 16" x 36" Rubber Mill; 7—W. & P. Mixers; Dry Mixers, Pulverizers, Grinders, Tubers, Hydraulic Pumps, Calenders, etc. CONSOLIDATED PRODUCTS CO., INC., 14-19 Park Row, New York, N. Y.

EQUIPMENT WANTED

WANTED—Banbury Mixer, Mills, Calender, Hydraulic Presses with pump and accumulator, Tubers, any condition. Address Box 1274, RUBBER AGE.

WANT TO PURCHASE one used Cameron Slitter. Give full details and price. Address Box 1271, RUBBER AGE.

WANTED TO BUY—3 roll experimental calender complete with motors and drive. Address Box 1276, RUBBER AGE.

WANTED—Multiple Plate Press, Steam Heated; About 3" opening to accommodate six or eight layers 36" x 54" (approx.) Address Box 1278, RUBBER AGE.

THIS is more than a war of mechanical monsters clashing in the night . . . more than a war of production.

It is a war for markets—*your* markets! The Axis wants your business—wants to destroy it for once and all.

With so much at stake, there is no doubt you will want to do everything you can to meet this Axis threat. Two ways are open: Speed production and BUY BONDS. The only answer to enemy tanks and planes is *more* American tanks and planes—and your regular, month-by-month purchases of Defense Bonds will help supply them. Buy now *and keep buying*.

HOW THE PAY-ROLL SAVINGS PLAN HELPS

When you install the Pay-Roll Savings Plan (approved by organized labor), you not only perform a service for your country but for your *employees*. Simple to install, the Plan provides for regular purchases of Defense Bonds through voluntary pay roll allotments.

Write for details *today!* Treasury Department, Section R, 709 Twelfth Street, NW., Washington, D. C.

U. S. SAVINGS

Bonds ★ Stamps

This space is a contribution to Victory by

THE RUBBER AGE

STATISTICS

SPECIAL NOTE: Much of the statistics carried in this section is of military value and accordingly have been discontinued for the duration of the war. See explanatory footnotes under each table.

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1938	397,620	125,357,730	14.07	5,652	1,799,124	14.21	391,968
1939	469,803	167,558,245	15.92	13,125	5,832,618	19.84	456,678
1940	780,820	303,117,726	17.33	7,060	3,197,136	20.22	773,760
1941*	739,678	301,224,726	18.18	4,177	2,116,945	22.63	735,501
1940:							
Sept.	75,770	29,317,540	17.27	666	349,443	23.43	75,104
Oct.	73,179	27,975,598	17.07	316	123,216	17.38	72,863
Nov.	69,844	26,917,136	17.21	126	52,020	18.45	69,718
Dec.	94,172	36,369,973	17.24	205	94,422	20.52	93,967
1941:							
Jan.	84,201	33,370,482	17.69	292	138,009	21.11	83,909
Feb.	70,745	28,469,753	17.97	327	144,139	19.69	70,418
Mar.	84,991	34,030,846	17.88	329	163,375	22.19	84,662
Apr.	61,288	24,193,639	17.62	238	99,371	18.96	61,054
May	98,438	39,537,574	17.93	370	204,865	24.72	98,068
June	62,124	25,179,498	18.09	476	257,254	24.13	61,648
July	94,622	39,296,581	18.54	423	219,597	23.17	94,199
Aug.	104,057	44,101,058	18.92	973	488,299	22.40	103,084
Sept.	79,212	33,045,295	18.62	749	402,036	23.96	78,463

Note: Statistics supplied by the Department of Commerce. Publication of figures discontinued with those of September, 1941, for the duration of the war. Gross Imports shown do not include latex or guayule. (*) First 9 months only.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Guayule: Dollars	Balata: Tons	Balata: Dollars	Jelutong: Tons	Jelutong: Dollars	Liquid Latex: Tons	Liquid Latex: Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	...	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1938	2,485	623,819	509	181,140	9,132	2,944,504	11,878	4,147,318
1939	2,232	463,345	694	265,553	6,640	1,603,418	27,438	10,467,552
1940	3,634	758,007	648	300,500	7,451	2,449,137	33,789	14,593,466
1941*	3,536	812,966	581	257,326	5,495	1,789,227	20,775	9,280,551
1940:								
Sept.	250	49,845	40	19,245	712	246,641	2,953	1,337,487
Oct.	381	77,286	70	38,092	1,150	382,168	1,156	512,153
Nov.	392	78,587	67	43,939	445	152,297	2,308	1,169,086
Dec.	278	62,586	54	39,471	1,102	341,876	3,534	1,539,957
1941:								
Jan.	447	104,128	57	32,910	698	221,911	2,184	1,019,741
Feb.	283	65,942	41	22,790	768	245,732	2,946	1,279,648
Mar.	426	98,187	36	16,147	715	258,514	1,707	774,225
Apr.	423	95,916	64	18,533	514	189,520	1,594	648,217
May	334	76,414	61	44,381	822	287,249	2,632	1,117,226
June	383	86,949	67	30,470	552	179,779	2,070	936,944
July	411	94,874	100	34,119	830	215,176	2,049	930,126
Aug.	499	111,502	41	19,344	159	50,934	1,984	779,079
Sept.	330	79,054	114	38,632	437	140,412	3,609	1,795,345

Note: Statistics supplied by the Department of Commerce. Publication of figures discontinued with those of September, 1941, for the duration of the war. Figures shown for latex are dry rubber content. (*) First 9 months only.

U. S. Consumption of Crude Rubber

(Including Latex)

	Figures on Monthly Basis: 1934	1935	1936	1937	1938	1939	1940	1941
Jan.	39,190	46,636	48,631	50,879	31,265	47,387	58,061	65,989
Feb.	40,515	42,720	36,841	51,950	25,357	43,422	52,078	62,692
Mar.	47,003	42,153	42,813	54,129	32,389	51,416	52,454	69,024
Apr.	44,853	44,247	52,031	51,859	29,730	45,268	52,361	71,374
May	42,918	41,101	50,612	51,795	30,753	45,484	54,513	71,365
June	40,147	36,156	52,772	51,860	32,540	48,438	47,834	84,912
July	32,553	35,917	48,250	43,703	34,219	44,975	48,354	68,653
Aug.	33,216	38,775	46,777	41,506	40,552	51,740	53,307	55,365
Sept.	30,258	37,086	46,449	43,945	40,183	51,402	52,469	53,655
Oct.	31,253	41,969	49,637	38,754	42,850	57,155	59,644	60,418
Nov.	34,748	42,310	50,433	34,025	49,050	55,677	57,716	N.A.
Dec.	36,569	42,474	49,754	29,195	48,143	49,636	59,709	N.A.
Tot.	453,223	491,544	575,000	543,600	437,031	592,000	648,500	663,447*

Note: Figures for 1934 to 1940, inclusive, are based on the annual surveys conducted by the former Leather & Rubber Division of the Bureau of Foreign & Domestic Commerce; figures for 1941 are estimates of the Rubber Manufacturers Association. Publication of figures was discontinued with those of October, 1941, for the duration of the war. (N.A.) Not Available. (*) First 10 months only.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks	Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks
1932	75,656	77,500	23.3	16,334	1937	185,033	162,000	29.8	28,800
1933	93,587	85,000	21.2	17,780	1938	122,400	120,800	29.9	23,000
1934	108.162	100.855	22.3	20,000	1939	186,000	170,000	28.7	25,250
1935	122.948	117,523	23.9	17,000	1940	208,971	190,244	29.3	32,636
1936	150,571	141,486	24.6	19,000	1941*	228,524	212,940	32.1	38,604†
	Figures on Monthly Basis								
1940:									
Jan.	19,239	16,341	28.1	27,089	July	14,299	14,539	30.1	27,129
Feb.	17,938	15,629	30.0	27,962	Aug.	17,161	14,464	27.1	28,526
Mar.	17,182	16,200	30.9	27,524	Sept.	16,379	14,835	28.3	29,039
Apr.	16,518	16,573	31.7	26,492	Oct.	19,300	16,807	28.2	30,816
May	17,499	15,984	29.3	27,141	Nov.	17,636	16,312	28.3	31,459
June	16,581	15,163	31.7	27,701	Dec.	19,239	17,397	29.1	32,636
1941:									
Jan.	20,413	19,086	28.9	33,380	July	23,111	21,725	31.6	36,751
Feb.	19,506	18,222	29.1	33,654	Aug.	24,111	20,864	38.7	39,099
Mar.	22,006	19,611	28.4	35,028	Sept.	24,678	24,032	44.8	38,055
Apr.	21,574	20,427	28.6	35,336	Oct.	26,560	25,009	41.4	38,604
May	22,775	21,405	30.0	35,871	Nov.	N.A.	N.A.	...	N.A.
June	23,790	22,559	26.6	36,265	Dec.	N.A.	N.A.	...	N.A.

Note: Figures for 1932 to 1940, inclusive, are based on the annual surveys conducted by the former Leather & Rubber Division of the Bureau of Foreign & Domestic Commerce; figures for 1941 are estimates of the Rubber Manufacturers Association. Publication of figures was discontinued with those of October, 1941, for the duration of the war. (N.A.) Not Available. (*) First 10 monthly only. (†) As of October 31, 1941.

U. S. Consumption of Gasoline

(In Thousands of Barrels of 42 Gallons)

	1939	1940	1941		1939	1940	1941
January	38,089	40,370	45,344	August	54,025	55,346	62,944
February	34,928	37,557	42,001	September	49,505	52,297	58,995
March	43,042	44,607	48,760	October	49,854	53,807	N.A.
April	44,264	47,683	55,154	November	47,407	49,074	N.A.
May	49,766	52,946	59,307	December	43,807	46,413	N.A.
June	50,133	55,459	58,360				
July	50,689	53,865	63,093	Total	555,509	589,424	493,958*

Note: Statistics supplied by the Bureau of Mines. Publication of figures was discontinued with those of September 1941, for the duration of the war. (*) First 9 months only. (N.A.) Not Available.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1930	17,364,096	1934	12,255,118	1938	10,619,338
1931	11,253,800	1935	18,664,107	1939	17,471,914
1932	6,261,336	1936	20,789,504	1940	19,378,558
1933	8,713,962	1937	22,257,798	1941	25,193,698
1942		1942		1942	
January ...	1,270,636	May	617,054	September .	633,209
February ..	823,357	June	554,786	October ...	.....
March	668,536	July	573,420	November .	.....
April	664,875	August	586,344	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1939																																
December	20	20	—	19¾	19¾	19¾	19¾	19¾	19¾	—	20⅞	20⅞	20½	20¾	20¾	20¾	—	20½	20¾	20¾	20¾	20¼	—	—	—	20¼	19¾	19¾	19¼	—	—	20
1940																																
January	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	18⅞	19⅛	19⅛	19¾	19½	19⅜	19⅜	19⅜	19⅛	19⅛	19⅛	19¼	19⅜	19⅜	19⅛	19⅛	18⅞	18⅞	18⅝	18⅝	18⅝	18⅝	18⅝	18¾	18⅝	19
February	18¾	18¾	18¾	18¾	18¾	18¾	18⅝	19⅛	19¼	19¼	18¾	18¾	18¾	18¾	18½	19⅛	19⅛	18¾	18¾	18¾	18⅞	18⅞	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18¾
March	18⅞	18⅞	18½	18½	18⅝	18⅝	18⅝	18⅞	19⅛	18⅞	18⅞	18¾	18¾	18½	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛
April	19⅛	19⅛	18⅝	18⅝	18⅝	18⅞	19⅛	19⅛	19⅛	18⅞	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛
May	19⅛	19⅛	20	20⅛	20	19⅞	20	20⅛	20⅛	20	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛
June	22	21⅝	21⅝	21⅝	20½	21⅜	21⅜	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝
July	21⅝	21⅝	20½	20½	19⅞	19⅞	19⅞	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝
August	19⅞	19⅞	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝
September	19⅞	19⅞	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝
October	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝
November	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝
December	20¾	20¾	20⅜	20⅜	21	20⅜	21	—	21	21	21	21	21	21	—	20¾	20¾	20¾	20⅝	20⅝	20⅝	21¼	21¼	20⅝	20⅝	21⅛	20½	20⅜	20⅜	20⅝	20⅝	21
1941																																
January	20⅞	—	20½	20½	—	20½	20⅜	20⅜	20¼	20¼	20⅞	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20⅜
February	—	—	19⅞	19⅞	19⅞	19⅞	19⅜	19⅞	19⅞	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
March	20⅜	20⅜	20⅜	21⅛	21⅛	21⅛	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½	21½
April	22⅛	22⅛	22⅛	22	22⅛	22⅛	22	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
May	24	23⅝	24⅛	24⅛	23⅞	24⅛	24	24	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛
June	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝
July	21¾	21¾	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝	21⅝
August	23	23	22⅝	22⅝	23	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝
September	—	—	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	—	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛
October	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	22⅝	23	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛
November	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛
December	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛	23⅛
1942																																
January	—	—	—	—	24½	24⅜	24⅜	24⅜	24⅜	—	—	—	24⅜	24⅜	24⅜	24⅜	—	—	24⅜	24	23⅞	24	24	23	23¾	23½	23¼	23	23½	23½	23¼	—	24

Note: In view of government regulations concerning the purchase of crude rubber trading in so-called "free" rubber practically stopped by the end of January, 1942, which accounts for the lack of quotations after January 31, 1942.

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Markets)

Average Price per Pound for Years 1913-1932

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	11.98
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	6.17
1916	72.50	1920	36.30	1924	26.20	1928	22.48	1932	3.46
1917	72.23	1921	16.36	1925	72.46	1929	20.59	1933	5.96

Average Monthly Price per Pound Since 1933

	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents	1940 Cents	1941 Cents
Jan.	9.32	13.10	14.35	21.37	14.63	15.75	19.06	19.86
Feb.	10.45	12.92	15.48	21.33	14.71	15.93	18.83	20.43
Mar.	11.01	11.51	15.89	24.09	13.55	16.26	18.58	22.12
Apr.	12.10	11.55	15.98	23.44	11.84	15.87	19.16	22.74
May	13.26	12.05	15.62	21.14	11.57	16.07	21.21	23.90
June	13.51	12.57	15.85	19.29	12.57	16.37	22.20	21.88
July	14.60	12.10	16.49	18.86	15.37	16.51	21.12	22.19
Aug.	15.47	11.98	16.25	18.37	16.08	16.67	19.62	22.70
Sept.	15.36	11.55	16.46	18.55	16.15	21.24	19.28	22.57
Oct.	13.96	12.62	16.55	16.28	16.89	19.89	20.33	23.10
Nov.	13.04	13.15	17.97	14.60	16.24	20.21	21.04	23.14
Dec.	12.98	13.28	20.01	15.41	16.05	20.01	20.76	24.04
Average for Year	12.92	12.37	16.41	19.39	14.64	17.57	20.10	22.40

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1941 May	1941 June	1941 July	1941 Aug.	Day	1941 May	1941 June	1941 July	1941 Aug
1	14	—	—	—	16	14⅛	—	—	—
2	14	—	—	—	17	—	—	—	—
3	—	13⅞	—	—	18	—	—	—	—
4	—	13½	—	—	19	14	—	—	—
5	—	13⅝	—	—	20	13⅛	—	—	—
6	—	13⅝	—	—	21	13⅜	—	—	—
7	—	—	—	—	22	13⅞	—	—	—
8	—	—	—	—	23	13½	—	—	—
9	—	—	—	—	24	—	—	—	—
10	—	—	—	—	25	—	—	—	—
11	—	—	—	—	26	13⅛	—	—	—
12	—	—	—	—	27	13⅛	—	—	—
13	—	—	—	—	28	13⅞	—	—	—
14	—	—	—	—	29	13⅞	—	—	—
15	14	—	—	—	30	13⅜	—	—	—
					31	—	—	—	—

Note: No quotations have been made on the London Exchange since June 6

Average Monthly Price Per Pound

Month	1938 Pence	1939 Pence	1940 Pence	1941 Pence	Month	1938 Pence	1939 Pence	1940 Pence	1941 Pence
Jan.	7.077	7.926	11.793	12.415	Aug.	7.841	8.545	12.818	
Feb.	7.029	7.942	12.577	12.769	Sept.	7.918	9.634	11.964	
Mar.	6.590	8.120	11.651	13.967	Oct.	8.355	10.177	11.813	
Apr.	5.793	7.910	10.980	14.228	Nov.	8.111	11.210	11.801	
May	5.632	8.002	11.600	13.670	Dec.	8.005	11.559	11.963	
June	6.147	8.216	13.046	—	Average for Year.	7.164	8.959	12.035	
July	7.464	8.271	12.410	—					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1942 Aug.	1942 Sept.	1942 Oct.	Date	1942 Aug.	1942 Sept.	1942 Oct.	Date	1942 Aug.	1942 Sept.	1942 Oct.
1	19.48	19.69	19.62	11	19.32	19.68	—	22	19.36	19.49	
2	—	19.53	19.57	12	19.22	19.69	—	23	—	19.62	
3	19.51	19.54	19.68	13	19.25	—	19.58	24	19.28	19.58	
4	19.67	19.60	—	14	19.41	19.78		25	19.55	19.56	
5	19.56	19.61	19.64	15	19.34	19.81		26	19.30	19.60	
6	19.65	—	19.48	16	—	19.76		27	19.32	—	
7	19.59	—	19.48	17	19.30	19.71		28	19.73	19.57	
8	19.21	19.58	19.76	18	19.40	19.64		29	19.78	19.49	
9	—	19.64	19.55	19	19.61	19.57		30	—	19.62	
10	19.12	19.75	19.59	20	19.53	—		31	19.78	—	
				21	19.43	19.41					

Average Monthly Price Per Pound

	1939 Cents	1940 Cents	1941 Cents	1942 Cents		1939 Cents	1940 Cents	1941 Cents	1942 Cents
Jan.	8.94	11.19	10.66	19.85	Aug.	9.30	9.84	17.06	19.45
Feb.	8.97	11.10	10.87	20.07	Sept.	9.30	9.69	17.94	19.62
Mar.	9.00	10.90	11.08	20.42	Oct.	9.24	9.62	17.31	
Apr.	8.87	10.89	11.48	21.10	Nov.	9.73	9.97	17.21	
May	9.56	10.33	12.97	20.88	Dec.	1097	10.18	18.09	
June	9.88	10.72	14.66	19.78	Average for Year	9.46	10.40	14.86	
July	9.71	10.42	16.55	20.27					

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of	ON HAND 1939	1940	1941	AFLOAT 1939	1940	1941	TOTAL 1939	1940	1941
Jan.	220,727	139,304	309,411	48,210	90,285	153,169	268,937	229,589	462,580
Feb.	207,882	129,023	320,372	55,814	112,257	136,955	263,696	241,280	457,327
Mar.	201,752	134,871	338,147	55,981	113,619	140,228	257,733	248,490	478,375
Apr.	188,074	152,645	329,767	57,918	102,557	153,484	245,992	255,202	483,251
May	187,980	148,881	359,234	54,046	109,364	147,459	242,026	258,245	506,693
June	173,493	154,313	339,108	51,274	119,138	175,499	224,767	273,451	514,607
July	165,450	175,455	395,216	52,990	139,629	132,304	218,440	315,084	527,520
Aug.	152,029	194,760	446,008	66,717	141,286	90,591	218,746	336,046	536,599
Sept.	136,824	220,597	473,684	68,310	137,888	141,756	205,134	358,485	615,440
Oct.	119,404	235,353	454,711	100,500	166,837	172,633	219,904	402,190	627,344
Nov.	105,205	250,412		114,044	158,095		219,249	408,507	
Dec.	125,800	288,864		91,095	145,950		216,895	434,814	

Note: Above figures include stocks held by United States Government.

STOCKS OUTSIDE REGULATED AREAS

(Figures from the International Rubber Regulation Committee)

1940	Singapore and Penang	Para and Manaos	United Kingdom	United States	Total
November	33,778	3,697	30,000*	276,943	344,418
December	26,773	2,165	35,000*	318,486	382,424
1941					
January	37,145	2,151	40,000*	309,411	388,707
February	46,888	2,510	40,000*	320,372	409,795
March	41,005	1,200	40,000*	338,147	420,352
April	42,065	2,205	40,000*	329,767	414,057
May	44,593	1,768	40,000*	364,107	450,485
June	43,263	915	40,000*	339,108	423,286
July	41,534	1,063	40,000*	395,216	477,813
August	44,920	1,145	40,000*	446,008	532,073
September	32,997	1,772	40,000*	473,684	548,453
October	48,399	2,048	40,000*	454,711	545,158

* Estimated.

STOCKS INSIDE REGULATED AREAS

(Figures from the International Rubber Regulation Committee)

1940	Malaya	N.E.I.[1]	Ceylon [1]	Other *	Total
November	43,693	39,267	11,675	3,997	98,632
December	48,787	48,622	11,850	4,124	113,383
1941					
January	47,198	45,137	13,196	4,329	109,860
February	55,512	48,795	14,677	4,064	123,048
March	44,522	48,534	13,841	4,210	111,107
April	53,237	46,787	14,432	4,009	118,465
May	46,511	49,184	14,444	3,772	113,911
June	46,758	51,354	11,908	4,432	114,452
July	49,666	56,352	13,595	4,113	123,726
August	46,558	55,601	12,444	4,003	118,606
September	46,299	48,667	13,052	2,140	110,158
October	50,325	.....	14,366	3,961	.....

(1) Estates and Dealers. (*) Estimated.

RUBBER STOCKS AFLOAT

End of: 1940	Afloat for United States	Afloat for Europe	All Other Afloat	Total Afloat
August	141,286	55,000	53,714	255,000
September	137,033	60,000	67,967	265,000
October	166,837	60,000	38,163	265,000
November	158,095	60,000	31,905	250,000
December	145,950	60,000	44,050	250,000
End of: 1941				
January	153,169	60,000	51,831	265,000
February	136,955	60,000	48,045	245,000
March	140,228	60,000	59,772	260,000
April	153,484	60,000	61,516	275,000
May	147,459	60,000	47,541	255,000
June	175,499	60,000	39,501	275,000
July	132,304	60,000	47,696	240,000
August	90,591	60,000	.....	.....

Note: *Total Afloat* figures are estimated at 1½ months' world shipments by the International Rubber Regulation Committee. *Afloat for U. S.* is supplied by the Rubber Manufacturers Association. *Afloat for Europe* is estimated. *All Other Afloat* is determined by subtraction.

TOTAL WORLD STOCKS

At End of:	1936	1937	1938	1939	1940	1941
January	600,479	454,249	549,762	497,665	433,841	753,021
February	599,355	445,265	565,833	479,578	429,551	769,193
March	583,318	447,856	586,666	460,723	447,472	783,737
April	567,172	428,249	586,291	438,252	465,345	765,521
May	541,871	413,134	568,158	429,979	470,981	777,429
June	520,255	434,250	573,136	407,640	500,774	771,241
July	519,074	445,782	580,654	418,639	547,708	780,324
August	500,520	457,462	565,394	397,345	579,119	839,019
September	493,585	470,768	551,447	396,867	631,888	874,917
October	486,159	479,398	540,976	413,274	651,775	905,138
November	466,491	493,266	512,196	395,217	659,308	.....
December	466,576	545,533	482,852	391,125	702,089	.....
Monthly Avge.	528,738	460,022	555,280	427,192	543,321	.....

Note: Figures prior to 1941 represent principal world stocks only, as supplied by the Department of Commerce. Figures since 1941 represent total world stocks, as compiled by the Commodity Exchange, Inc.

U. S. Tire and Tube Statistics*

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis

Quarter	1934	1935	1936	1937	1938	1939	1940	1941
Jan.-Mar.	13,437	13,355	11,376	15,565	7,314	13,946	14,896	16,334
Apr.-June	13,565	12,597	14,892	15,834	7,380	13,759	15,636	18,308
July-Sept.	9,822	11,312	14,914	12,207	10,794	15,182	13,877	15,123
Oct.-Dec.	10,406	12,099	14,858	9,704	12,360	14,726	14,777	11,768
Total	47,230	49,363	56,040	53,310	37,848	57,613	59,186	61,533

Shipment Figures on Quarterly Basis

Quarter	1934	1935	1936	1937	1938	1939	1940	1941
Jan.-Mar.	10,730	11,154	10,554	14,143	7,388	12,445	12,791	15,264
Apr.-June	14,998	13,473	15,940	15,741	9,564	15,107	17,595	21,276
July-Sept.	11,648	13,489	14,037	13,106	11,243	15,791	12,904	18,104
Oct.-Dec.	9,310	12,066	12,855	10,495	12,098	14,165	15,484	12,519
Total	46,686	50,182	53,386	53,485	40,293	57,508	58,774	66,163

Inventory Figures [2]

Quarter	1934	1935	1936	1937	1938	1939	1940	1941
Jan.-Mar.	11,651	11,675	8,762	12,004	10,547	9,963	10,789	10,149
Apr.-June	10,219	10,755	7,556	12,081	8,337	8,632	8,871	7,088
July-Sept.	8,419	8,288	8,690	11,200	7,859	8,080	9,837	5,154
Oct.-Dec.	9,455	8,196	10,717	10,383	8,166	8,665	9,127	4,417

Figures for Recent Months

	PRODUCTION 1940	1941	1942	SHIPMENTS 1940	1941	1942	INVENTORY [2] 1940	1941	1942
Jan.	4,955	5,487	1,369	4,274	4,850	1,231	9,352	9,797	4,550
Feb.	4,916	5,162	1,113	4,144	4,896	1,116	10,137	10,029	4,553
Mar.	5,025	5,686	1,156	4,373	5,518	1,027	10,789	10,149	4,809

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis

Quarter	1934	1935	1936	1937	1938	1939	1940	1941
Jan.-Mar.	12,823	12,553	11,891	15,831	7,314	12,383	12,801	15,349
Apr.-June	13,191	11,631	14,624	15,413	7,380	11,847	13,703	17,584
July-Sept.	10,321	11,270	15,320	12,038	10,794	13,118	12,425	13,858
Oct.-Dec.	9,891	12,425	15,201	9,092	12,360	13,300	13,308	10,591
Total	46,226	47,879	57,036	52,374	37,848	50,648	52,237	57,382

Shipment Figures on Quarterly Basis

Quarter	1934	1935	1936	1937	1938	1939	1940	1941
Jan.-Mar.	10,640	11,252	11,367	14,606	7,387	11,422	11,683	14,264
Apr.-June	14,553	11,928	15,113	15,495	9,564	13,010	14,978	18,576
July-Sept.	11,545	13,251	15,069	12,901	11,243	13,449	11,344	15,490
Oct.-Dec.	8,306	11,636	12,874	9,765	12,099	13,309	14,209	11,359
Total	45,044	48,067	54,423	52,767	40,293	51,190	52,214	59,689

Inventory Figures [2]

Quarter	1934	1935	1936	1937	1938	1939	1940	1941
Jan.-Mar.	10,244	10,406	8,660	11,993	10,547	8,752	8,110	8,069
Apr.-June	8,795	10,050	8,075	11,833	8,337	7,549	6,848	7,010
July-Sept.	7,639	7,565	8,595	11,326	7,859	7,206	7,970	5,431
Oct.-Dec.	9,180	8,231	10,945	10,312	8,166	7,306	7,017	4,678

Figures for Recent Months

	PRODUCTION 1940	1941	1942	SHIPMENTS 1940	1941	1942	INVENTORY [2] 1940	1941	1942
Jan.	4,199	5,112	1,328	3,761	4,473	1,257	7,417	7,633	4,712
Feb.	4,207	4,887	1,051	3,805	4,610	1,099	7,828	7,924	4,678
Mar.	4,395	5,349	1,129	4,117	5,182	986	8,110	8,069	5,026

[1] These figures are based on reports received from the Rubber Manufacturers Association. They are revised frequently and the latest available issue should be consulted for most reliable figures.

[2] Stocks held by manufacturers at end of period indicated.

Automobile Production

Year	United States Total	Passenger Cars	Trucks	Canada Total	Passenger Cars	Trucks	Grand Total
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,085	2,000,985	488,100	166,086	123,761	42,325	2,655,171
1939*	3,577,292	2,866,796	710,496	155,426	108,369	47,057	3,732,718
1940	4,469,354	3,692,328	777,026	222,984	110,126	112,858	4,692,338
1941	4,838,561	3,744,300	1,094,261	270,431	94,045	176,386	5,108,992
1941							
July *	444,241	343,748	100,493	24,654	3,849	20,805	468,895
Aug.	147,600	78,529	69,071	17,192	3,160	14,032	164,792
Sept.	234,255	167,790	66,465	14,496	2,548	11,948	248,751
Oct.	382,000	295,568	86,432	19,360	5,635	13,725	401,360
Nov.	352,347	256,101	96,246	21,545	7,003	14,542	373,892
Dec.	282,205	174,962	107,243	20,313	6,651	13,662	302,518
1942							
Jan.	238,261	147,858	90,403	21,751	4,249	17,502	260,012
Feb.	134,134	52,200	81,834	20,181	3,989	16,192	154,315
Mar.	94,510	6,216	88,294	20,188	3,192	16,996	114,698

* Revised.

Note: U. S. figures represent factory sales; Canadian, production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA							NETHERLAND INDIES						
	Gross Exports	Imports	Net Exports	Ceylon	India & Burma	Sarawak	British North Borneo	Thailand	Java & Madura	Sumatra E. Coast	Other N.I.	Indo-China	Amazon Valley	All Other	World Total
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,413
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,536
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49 692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,528	15,178	17,792	9,512	41,080	57,526	94,501	145,909	58,518	14,618	12,920	887,892
1939	553,324	177,851	375,473	61,026	15,881	24,014	11,864	41,266	72,786	117,791	181,272	65,140	13,892	22,224	1,002,629

	British Malaya [1]	N.E.I.	Ceylon [2]	India & Burma [2]	North Borneo	Sarawak	Thailand	Indo-China	Oceania	Africa [3]	Liberia	South America	Mexico (Guayule)	Grand Total
1940	540,417	536,740	88,894	23,317	17,623	35,166	43,940	64,437	2,267	10,103	7,223	17,601	4,106	1,391,834
1940:														
Sept.	58,892	44,009	9,985	1,319	1,743	2,404	3,247	9,303	100	800	323	1,295	200	133,715
Oct.	52,767	50,139	8,127	1,841	1,693	2,564	3,355	2,082	200	800	600	1,860	200	126,228
Nov.	36,045	37,387	5,623	2,626	1,130	3,360	3,463	6,715	200	800	600	1,500	200	99,649
Dec.	56,263	35,325	10,700	3,405	1,028	3,520	5,343	9,000	200	600	813	1,427	392	128,216
1941:														
Jan.	37,804	58,593	7,859	1,486	2,085	2,445	2,137	9,058	333	667	750	2,103	288	125,608
Feb.	27,115	42,091	4,332	1,421	1,686	2,922	4,137	1,995	96	854	828	1,814	414	89,705
Mar.	56,651	53,233	6,073	1,770	1,154	3,726	5,712	6,286	117	636	958	2,835	355	139,506
Apr.	40,590	48,915	6,985	1,661	2,175	3,118	4,271	....	263	864	750	2,009	423	112,024
May	53,062	48,099	7,638	1,831	1,237	3,849	1,841	6,225	156	800	180	1,080	334	126,332
June	51,247	48,496	8,925	1,056	986	3,195	2,831	7,318	200	800	919	1,510	250	127,733
July	53,373	53,429	7,387	939	1,803	3,799	3,614	3,445	200	800	750	1,253	250	131,042
Aug.	46,404	51,890	9,081	725	1,812	3,086	4,852	6,496	200	800	750	1,288	250	127,634
Sept.	70,598	65,496	6,706	145	1,371	2,495	6,524	8,000	200	800	750	1,421	250	164,756
Oct.	31,101	54,038	8,315	1,563	2,264	3,044	3,074	6,000	200	800	750	2,149	250	113,548

(1) Including Brunei and Labuan; figures shown represent rubber which has actually been shipped and include rubber from the free stocks in Singapore and Penang. (2) Exports of domestic produce. (3) Exclusive of Liberia. Notes: Figures shown prior to 1940 were furnished by the United States Department of Commerce. Figures since 1940 were furnished by the International Rubber Regulation Committee, which accounts for the difference in the principal producing countries shown. Many figures for current months are provisional only and are later revised when more definite statistics are available. Therefore, it is suggested that figures from the most recent issue should be taken as more reliable.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	3,510	2,292	2,008	567	371,405
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,290	1,870	617,957
1927	403,472	60,249	14,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,367	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,063	1,055,356
1938	406,343	133,079	59,660	90,200	25,696	45,836	28,170	25,650	11,944	11,309	5,092	16,034	2,400	9,936	871,349
1939	486,348				31,615	42,352			15,426	9,612	7,051				
1940	811,564														
1940:															
Feb.	41,797	7,500	5,000*	....	3,508	5,241	1,500*	2,000*	1,846	694	495	1,200*	200*	....	....
Mar.	58,302	14,200	5,000*	....	3,062	6,057	1,500*	2,000*	1,784	....	627	1,200*	200*	....	....
Apr.	70,135	16,400	5,000*	....	3,096	2,000*	1,500*	2,000*	1,612	....	....	1,200*	200*	....	....
May	50,610	10,000	5,000*	....	3,108	2,500*	1,500*	2,000*	2,128	....	....	1,200*	200*	....	....
June	53,266	9,500	5,000*	....	1,062	3,000*	1,500*	2,000*	1,181	....	....	1,200*	200*	....	....
July	69,496	19,500	5,000*	....	5,112	3,000*	1,500*	2,000*	1,902	....	....	1,200*	200*	....	....
Aug.	72,612	21,250	5,000*	....	4,605	4,500*	1,500*	2,000*	2,508	....	....	1,200*	200*	....	....
Sept.	78,306	25,940	5,000*	....	2,743	....	1,500*	2,000*	2,485	....	....	1,200*	200*	....	....
Oct.	74,400	.....	5,000*	....	8,336	....	1,500*	2,000*	590	....	....	1,200*	200*	....	....
Nov.	72,775	.....	5,000*	....	5,451	....	1,500*	2,000*	1,366	....	....	1,200*	200*	....	....
Dec.	97,794	.....	5,000*	....	7,437	....	1,500*	2,000*	721	....	....	1,200*	200*	....	....
1941:															
Jan.	86,541	.....	5,000*	....	6,290	....	1,500*	2,000*	1,065	....	....	1,200*	200*	....	....
Feb.	73,647	.....	5,000*	....	3,770	....	1,500*	2,000*	1,717	....	....	1,200*	200*	....	....
Mar.	86,794	.....	5,000*	....	3,879	....	1,500*	2,000*	3,486	....	....	1,200*	200*	....	....
Apr.	64,521	.....	5,000*	....	2,531	....	1,500*	2,000*	2,326	....	....	1,200*	200*	....	....
May	101,034	.....	5,000*	....	5,596	....	1,500*	2,000*	1,549	....	....	1,200*	200*	....	....
June	64,101	.....	5,000*	....	2,818	....	1,500*	2,000*	1,373	....	....	1,200*	200*	....	....
July	96,658	.....	5,000*	....	4,143	....	1,500*	2,000*	2,003	....	....	1,200*	200*	....	....
Aug.	105,556	.....	5,000*	....	10,683	....	1,500*	2,000*	1,251	....	....	1,200*	200*	....	....
Sept.	81,742	.....	5,000*	....	....	....	1,500*	2,000*	4,392	....	....	1,200*	200*	....	....

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

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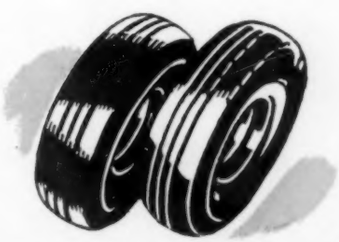

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